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26 SEPTEMBER 1986

Worldwide Report

**NUCLEAR DEVELOPMENT  
AND  
PROLIFERATION**

**FBIS** FOREIGN BROADCAST INFORMATION SERVICE

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WORLDWIDE REPORT  
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HONG KONG

DAMAGE TO WATER SUPPLY FROM DAYA BAY FEARED

Hong Kong SOUTH CHINA MORNING POST in English 31 Jul 86 p 4

[Text]

HONGKONG'S water supply would be contaminated if an accident occurred at the Daya Bay nuclear plant, even if the territory was not directly affected by fallout, a protest group said yesterday.

A spokesman for the Joint Conference for the Shelving of the Daya Bay Nuclear Plant, Mr Anthony Ha, said that Hongkong purchased water from the mainland and so would be affected if it became contaminated.

"Water is not like food which can be imported from foreign countries. Once there is leakage, we will have little choice but to consume contaminated water," said Mr Ha.

He was speaking at a press conference to comment on the feasibility study on Daya Bay which was released this week.

The study is six years old and Mr Ha said, in the light of the Chernobyl nuclear disaster, a new investigation should be carried out to as-

sess the risks involved in the Daya Bay project.

At the time the feasibility study was compiled - between November 1979 and November 1980 - the worst accident in the nuclear industry was the Three Mile Island incident in the US which occurred in 1979.

Mr Ha said the joint-venture company building the Daya Bay plant should wait until detailed reasons behind the Chernobyl accident were known.

Mr Ha also disagreed with the study's figures for the cost of "decommissioning" (or closing down) the plant after it was in operation.

The study said the decommissioning process would cost about 10 per cent of the total construction costs - \$2.7 billion calculated at today's prices.

But Mr Ha pointed out that since the report claimed the process would take 50 to 100 years to complete the price would be far higher.

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HONG KONG

## PAPER PUBLISHES SPECIAL REPORTAGE ON DAYA BAY PROJECT

### Government Answers to Questions

Hong Kong HONGKONG STANDARD in English 18 Jul 86 p 13

[Text]

**COMMENTS** by the Government on the questions raised by the Committee of Concern for Nuclear Energy and the Umelco members on the Daya Bay nuclear power plant.

**QUESTION:** Since the cause of the Chernobyl incident has not yet been fully established, it is premature for Government to accept the view of the experts of the Daya Bay project that the Soviet incident was caused by the use of graphite.

**ANSWER:** Pending a full report, if there is going to be one, on the Chernobyl incident, the Government has not ventured any suggestion as to the cause of the incident. What has been established and accepted by the Government is that the reactors used at the Chernobyl plant are the graphite moderated RBMK type and are entirely different in design from the pressurised water reactors (PWRs) to be installed at Daya Bay, and that the PWRs will be of a higher safety standard and more technologically advanced than the RBMK. The Government has asked the consultants (United Kingdom Atomic Energy Authority at Harwell) to take into account any lessons which may be learnt from the Chernobyl incident in the development of accident probability assessment and

outline contingency plans.

The Government reportedly commissioned the United Kingdom Atomic Energy Authority last year to conduct five studies on the Daya Bay project. The first study is of the feasibility of the project; the second of the possible accidents which may occur and the effects on Hongkong; and the third of the emergency measures which have to be taken in case of such accidents. It is irresponsible of the Government to have supported the project even before the second and the third studies are completed.

Before ExCo decided on the project in January 1985, did ExCo Members have the chance to consider any reports on the safety of the project?

As stated by FS in the Legislative Council on May 7, the Executive Council was fully informed of and consulted on all stages of development in the negotiations between China Light and Power (CLP) and China. In January 1985, the Executive Council advised that the Government should inform the Hongkong Nuclear Investment Company (HKNIC) and CLP that the Government had no objection to their entering contractual arrangements prepared for the formation of the Joint Venture Company, and purchase, initially by HKNIC and finally by

CLP, of electricity from the project. An important consideration taken into account by the Executive Council was of course the safety aspect of the proposed nuclear power plant in Daya Bay. In this connection, the Council noted that the design of the Daya Bay Station will be identical to that of Units 5 and 6 of the Gravelines Nuclear Power Station in France and that it would adopt proven French technology. It was also noted that a National Nuclear Safety Authority directly responsible to the State Council, has been established by China and it would be assisted by the French Central Service for the Safety of Nuclear Installations which would be involved in both the licensing procedures for the Daya Bay plant and the setting up of a Chinese nuclear inspectorate. The inspectorate would carry out surveillance of nuclear installations and would be responsible for ensuring that nuclear plants operate in compliance with Chinese safety regulations which would reflect nuclear safety standards applicable in France and adopted by the International Atomic Energy Agency and the International Commission on Radiological Protection.

It should be pointed out that the feasibility study of the project was compiled by China Light and Power Co

Ltd and the Guangdong Power Co in 1981, and it is not within the terms of reference of the Harwell consultancy study commissioned by the Hongkong Government. What the Government has asked the Harwell consultants to do is to conduct five studies which are to provide technical evaluation of the radiation monitoring programme; to produce an assessment study of the probability of different accidents at the nuclear power station and the consequences for Hongkong; to develop the design of an outline contingency plan for Hongkong; to provide initial training for selected Government officers and to advise on an effective public education programme on nuclear related matters. The consultancy studies were intended to enable the Government to provide public reassurance and to take effective action in the unlikely event of an accident. The purpose of these studies is to provide the Government with an independent and expert evaluation of the environmental and safety impacts of the plant on Hongkong.

Presumably China has already completed studies on the environmental impact of the Daya Bay Plant. Did the Hongkong Government consider the environmental impact reports compiled by the Chinese authorities before making the decision on the Daya Bay project?

The present site at Daya Bay was chosen by the Chinese authorities on the basis of the feasibility study mentioned above which took into account the general topographical and meteorological factors covering the surrounding areas including that of Hongkong. The Guangdong Nuclear Power Joint Venture Company (GNPJVC) is now conducting a full environmental impact report and an initial safety analysis report in relation to the Daya Bay project as a first stage of the licensing procedure. These reports will cover the implications for Hongkong. A GNPJVC delegation visited Hongkong in May this year with a view to collecting data for their studies. The Hongkong Government is assisting GNPJVC in obtaining the necessary information.

Will the Government consider asking the contractor, Electricite de France (EdF), to arrange an independent inspection before the PWRs are put into operation?

As stated by the Government, the responsibility for designing, constructing and operating the Daya Bay nuclear plant rests with the GNPJVC. The Hongkong Government is therefore not in a position to ask the French National Utility Electricite de France to conduct an inspection before the PWRs are put into operation.

In view of the serious implications of the project on the well-being of the Hongkong people, the latter should have been properly consulted before the project was given the support of the Hongkong Government.

The Executive Council has been consulted on the project. The Government has, in addition, issued numerous public

statements and press releases on this project. The public have been made aware of the developments and their views, expressed through various channels, and already taken into account by the Government before it raised no objection in January 1985 to HKNIC to enter into contractual arrangements with their Chinese counterpart to form the GNPJVC.

Is it intended that environmental matters relating to the Daya Bay plant will be put to the Environment Protection Committee for advice? What are the reasons for putting the monitoring of radioactivity in the charge of the Royal Observatory rather than the Environmental Protection? What role does the Medical and Health Department have in the monitoring?

The Royal Observatory is charged with the responsibility of radiation monitoring because it is best equipped within the Government to carry out the job. Other departments do contribute input to the monitoring process. The Medical and Health Services Department, for example, advises on the health impacts of radiation. The Environmental Protection Department, on the other hand, provides input on broad environmental issues. A working group with representatives from the Environmental Protection Department, the Royal Observatory, the Medical and Health Services Department, the Electrical and Mechanical Services Department and Security Branch, co-ordinated by the Economic Services Branch, is in place to consider the safety and environmental issues. The present arrangement is considered effective in co-ordinating the various activities within the Government.

#### Answers from Quangdong Company

Hong Kong HONGKONG STANDARD in English 18 Jul 86 pp 11, 12

[Text] ANSWERS provided by the Guangdong nuclear power joint venture company to questions raised by Umelco on the safety of the Daya Bay project.

QUESTION: PWRs are not as safe as the Government has claimed them to be. Only as recently as 1979, a meltdown occurred in a PWR on Three Mile Island, causing considerable panic.

Also, according to the findings of the Sizewell inquiry conducted in the United Kingdom two years ago, PWRs have more than 80 design defects and most of these are considered to be serious. These defects have since not yet been rectified. ANSWER: THE Three Mile Island incident, whilst being serious in a number of aspects, resulted in insignificant risk and effect on the surrounding population. The main factor which

prevented environmental impact was the containment of the nuclear plant.

Since the Three Mile Island incident, improvements have been made to overcome concerns that arose and these improvements have been incorporated into the French programme and the Daya Bay design.

The report on the Sizewell enquiry has not yet been published and so the



outcome of all the issues raised there has not yet been stated. We are aware that approximately 80 points were raised by the UK Nuclear Installations Inspectorate (NII), which is the UK licensing authority. However, we believe these are not "defects" and comment further as follows:

- The PWR design proposed for the UK is not a replication of an existing plant and is not derived from a long series of standardised plants as is the case for Daya Bay. On the contrary, it incorporates features developed specifically by the UK utility, CEBG. It is also the first PWR that will be licensed by the NII.

- Our understanding is that the majority of the 80 points raised by the NII were in the nature of requests for more information and substantiation and many were not major. We understand that most were satisfactorily answered without a need for any changes. They should not, therefore, be thought of as "defects."

We understand 6 points were considered to be more significant, but even in these cases, we are only aware of one point where a modification is likely. That one point apparently concerned an improvement of fire protection standards for cabling. Such an improvement has already been made for the Daya Bay project.

**THE protective shield of the Daya Bay plant may not be able to resist the enormous pressure and heat from the core of the plant in the event of a meltdown.**

**THE Emergency Core Cooling Systems have been developed to prevent a core meltdown. They operate automatically and are engineered to very high standards of reliability, which include complete duplication of all functions (that is, 100 percent backup).**

The containment is designed to withstand a sudden complete break in the main nuclear system whereby the normal flow of pressurised water through the reactor core is lost (referred to as a "loss of coolant accident" or LOCA).

This is an extremely unlikely event, bearing in mind that the walls of the pipework carrying the pressurised water are 7 cm thick. In the event of a loss of coolant accident, the emergency core cooling systems operate to prevent overheating of the core, and the discharge of hot pressurised water from wherever the break has occurred will be held inside the containment.

Sprays of cold water operate automatically inside the containment to condense some of the steam that forms from the escaping pressurised water.

The containment is designed and tested to withstand a pressure of 5 bars (five times atmospheric pressure). This is the highest pressure that can occur in the event of the most serious loss of coolant accident occurring when the reactor was operating at full load.

The complete loss of coolant accident is the worst accident considered to be possible and is the design basis for the containment and safety systems. The nuclear plant design has to be able to prevent any radioactive release into the environment in the event of such an incident.

Further analyses are, however, performed on more serious incidents, including a meltdown. The criterion for French plant is that none of these more serious incidents must lead to unacceptable consequences.

In France, consequences are deemed unacceptable if they require evacuation more than 10 km from the power station. All provisions needed to achieve this level of safety will be incorporated at Daya Bay.

In practice, the analyses

indicate a margin of safety, that is, serious incidents such as a meltdown probably will not require evacuation as far away as 10 km. These conclusions are supported from other sources:

- Studies have been under way for several years, particularly in the USA, on the effects of severe accidents in nuclear plants.

These studies are concluding that incidents such as a meltdown will not lead to the extreme consequences that had previously been suggested. A major factor in this respect is a large pool of water that will form at the base of the containment in the event of a loss of coolant accident.

- In the Three Mile Island incident, a partial meltdown did occur. However, the pressure inside the containment did not rise above the level for which the containment was designed.

It can also be pointed out that the radioactive release inside the containment was far below the levels predicted by previous calculations.

**HAVE any serious accidents even happened with the nuclear plant in France, whose contractor is responsible for building the nuclear plant in Daya Bay?**

If the answer is in the affirmative, then what is the cause of the accidents and the casualty rate? Are there any contingency plans in France for evacuation in case of accidents?

THERE have been no serious accidents on nuclear plants in France. In the case of the French PWR series of plants from which Daya Bay is derived, there have been no incidents of any radioactive release even inside the containments. This represents a very high safety record.

There are contingency plans in France for the event of an incident at a nuclear station. They are

established on a case-to-case basis, according to local conditions at each location.

The contingency plans do include the possibility of evacuation of areas in the immediate vicinity of the power station sites but, as stated previously, there are no circumstances where evacuation beyond 10 km from the site is envisaged.

ACCORDING to a lecturer (Mr Chow Cheun-bo) in the Department of Geography, Baptist College, Daya Bay is located in an earthquake-prone zone. The Daya Bay nuclear plant is therefore more vulnerable to damage caused by earthquakes.

THE seismicity of the Daya Bay area has been studied extensively both by PRC experts and independently by French and British experts.

Taking account of all available information including historical earthquake records, a design basis has been determined for the plant. This design basis means that the plant can be shut down safely without radioactive releases in the event of an earthquake causing a ground acceleration of 0.2g.

This figure is typical of other plants and all experts agreed it allows for the most severe earthquake that could be envisaged for the Daya Bay site.

Some experts considered it to be very conservative and that earthquakes could never reach this intensity.

Consequently, Daya Bay

cannot reasonably be described as being in an "earthquake-prone" area and the plant cannot be described as being "vulnerable" to earthquake damage.

IT is understood that no insurance company has been willing to offer accident or third-party insurance to cover mishaps in nuclear plants. This could serve as evidence of the extremely dangerous nature of nuclear plants.

PROTECTION against liability for nuclear-related risks will be provided for Daya Bay in the same way as virtually all countries with nuclear power stations.

According to this practice, the ultimate protection takes the form of a Government-supported indemnity rather than insurance. Such provisions have already been made by the PRC Government.

THE nuclear industry in China is still at a very primitive stage and it is, therefore, naive to assume that high safety standards could be maintained for the Daya Bay project.

CHINA has established nuclear technology for military applications. However, the fact that Daya Bay will be the first commercial nuclear-generating plant in China has been perhaps the single most significant factor in determining the means of proceeding.

The strategy developed for managing the project and for contracting is based on extensive use of international standards and experience and participation by internationally-recognised contractors and consultants at all stages. In particular:

- The Daya Bay nuclear plant design is based on an established series of standardised plants in France. There are a total of 59 units of 900MW class of which 37 are in operation.

- The standards to be used for the design, manufacture and construction of the nuclear equipment are those applicable in France, together with certain relevant international standards.

The equipment will be designed and manufactured in France by the French contractor Framatome, which will also supervise its erection on site and participate in its commissioning and start-up.

- Contractors from France and other countries with experience on other nuclear projects will take a leading role in the civil works construction on site.

- The French utility Electricite de France (Edf) will take a leading role in the technical management of the project, including review of the work of other contractors both in Europe and in the PRC, the engineering of peripheral equipment and the design of the civil works for the nuclear equipment.

- An independent foreign Quality Assurance Consultant will be appointed.

[Material in slantlines printed in boldface]

There will be intensive training in France for staff involved in the operation and maintenance of the station. This will include "hands-on" experience on French stations and formal qualification issued by EdF for staff who reach the required standards in training.

/What consideration is being given to arrangements for disposing the nuclear waste products of the plant and where will the disposal take place?/

The solid waste produced during operation is considered in two categories as follows:

/High-Level Waste:/

The high-level waste arises in small quantities inside the nuclear fuel elements. When fuel is removed from the reactor, it will first be stored in controlled conditions on site to allow time for some decay of the most active fission products. It will later be removed from site in heavily-shielded containers. There are then two alternatives:

1. Either the fuel is stored long-term at a centralised facility, or
2. The fuel is reprocessed, during which the small proportion of active waste is removed and converted into a stable form of glass or ceramic. In this form, the waste is suitable for long-term disposal underground in geologically-stable rock formations.

PRC stated policy is to develop both of these alternatives.

/Intermediate and Low-Level Wastes:/

This covers a range of materials from chemicals and, during the operations of the reactor, down to overalls and shoes of operators that may have picked up a trace of radioactivity.

There will be the same type of plant at Daya Bay as on French stations and elsewhere which first feeds the waste into a concrete mix and sets the mix into drums.

A further layer of concrete is then added around the outside as a shield so that the blocks can be handled safely. These blocks are then removed from the site to controlled underground disposal locations.

The locations for nuclear waste disposal are being treated as a national PRC issue and are not yet selected. An investigation programme is underway however.

/Would it be possible to find an alternative site for Daya Bay in China further away from Hongkong and other populous areas?/

The Daya Bay site has been selected after consideration of the following major criteria:

Compliance with internationally-accepted standards for remoteness from population centres, including Hongkong, on the basis that evacuation plans for Hongkong are impracticable and must not be necessary

The need for acceptable rock foundation conditions and an acceptable distance from any active geological faults.

The need for large volumes of sea water to be available continuously for cooling purposes, without excessive silt or pollution, and the need for sea access of adequate draft for shipments to the site.

The need for transmission grid connections to both the Guangdong and Hongkong electricity distribution systems, to enable reliable and stable operation and transfer of power.

A suitable site further away than Daya Bay has not been identified.

/Since many of the major nuclear accidents in the past have reportedly been the result of human error (Chalk River, Canada 1952, Idaho 1985; Minnesota 1971, Brown's Ferry, Alabama 1975; Three Mile Island; Ohio 1985), what measures will be taken to ensure that mistakes, misunderstandings, misreadings, miscalculations and false assumptions will be avoided or minimised in the Daya Bay plant?/

The need for close attention to the qualifications and training of operators and the management of the power station organisation has been highlighted by incidents elsewhere.

There is, however, extensive protection in depth in the nuclear equipment which is there to maintain safe conditions both in the event of human error and in the event of equipment malfunctions. In plants of the type to be used at Daya Bay, this protection has been proven to be effective.

In reaching this standard of safety, there have been significant improvements resulting from incidents elsewhere, particularly the Three Mile Island incident. The improvements include:

Improvement in the so-called "man-machine" interface. For example, the layout of the control room and the presentation of information have been modified such that the operator is better able to judge the status of the plant and action to be taken.

Operating procedures for normal operation, incidents and accidents have been extensively revised and improved.

Much greater importance is now attached to operator training and qualifications. In addition, it is increasingly the practice to provide a simulator on site for continued training and this will be done at Daya Bay.

/What assurances are there that unforeseen political changes, a change in the allocation of financial resources, or corruption among officials in China will not hinder the construction of the plant or cause its safety standards to be lowered?/

The PRC has given a commitment from the highest level that safety will take first priority on the Daya Bay project.

As has already been stated, there is extensive international participation in the project with several layers of supervision and checks. This represents a higher level of supervision than is normal, say, on domestic French projects, and is being provided to ensure all contractors comply with the necessary standards.

/Has any consideration been given to building the latest design of nuclear reactor--known as an inherently safe reactor--which has no risk of a meltdown at Daya Bay instead of a PWR reactor?/

The so-called "inherently safe" reactor is so far only a concept which exists on paper. It has never been built and the detailed design work has not yet been undertaken. We are not aware of any firm plans to proceed with this concept.

For reasons stated previously, we would not want to pioneer a prototype design at Daya Bay. On the contrary, we have opted for an extremely well proven design with a history of safe operating experience.

/Will there be monitoring of the Daya Bay Plant within China close to the plant in order to detect high levels of radiation well before they reach Hongkong, and, if so, what communication will there be between the Chinese and Hongkong so that Hongkong is alerted before the radiation reaches Hongkong?/

There will be monitoring of radiation levels both within the power station site and in the vicinity. The monitoring equipment is extremely sensitive and can detect small changes in background radiation.

Since, on average, 70 percent of the power from Daya Bay will be fed to Hongkong, there will be close operational communications between the power station and the Hongkong system.

In addition, according to the terms of the Joint Venture Contract, the head of the operations department will be nominated by HKNIC. Consequently, the status of the plant will be known at all times in Hongkong, both during normal operation and in any abnormal situation.

Further lines of communication are for the Government to consider.

/In view of the declining price of oil and the continuing cheapness of coal, are the economic considerations that led the Government to support the Daya Bay project in 1983 still valid?/



/What, according to 1986 calculations, will be the financial benefits to the Hongkong consumers of obtaining electricity from the Daya Bay Plant in the 1990s instead of obtaining it from conventional oil or coal-fired plants?/

Detailed economic studies for the Daya Bay Power Project have been carried out many times since its inception in 1980.

The most significant economic study was conducted by the Government Consultants, Lazard Brothers, in 1984. In this study, various sensitivity scenarios were considered, including variations in the prices of fossil fuels.

It is believed that the Government was satisfied about the economics of the project as detailed in the report, including considerations of fossil fuel price variations, before they approved the go-ahead of the project.

The recent softening in oil and coal prices is considered to be temporary. Under the present fossil fuel prices, development of new mines will be greatly affected, which in turn will push the prices up eventually.

On the other hand, the nuclear power station will be able to benefit from the low interest rates currently prevailing.

The present export credit interest rate for China is 8.8 percent p.a., which is lower than the original planning figure of 9.5 percent p.a.

It is probable that the interest rate will reduce further later this year.

The present overall situation is that despite the softening of the prices of fossil fuels, nuclear generation is still likely to be cheaper than fossil-fired generation in the long run.

It should be pointed out that in order to provide addition protection to consumers in Hongkong, an article was negotiated in the Joint Venture Contracts which states that electricity to be purchased from the Guangdong Nuclear Investment Company under the Electricity Resale Contract will be limited to no higher than the cost of coal-fired electricity for the first six years of operation of the nuclear power station.

The calculation of cost of coal-fired electricity is defined in a formula specified in the Joint Venture Contracts which were approved by the Government.

/What plans for the construction of new conventional power stations in Hongkong by CLP have been cancelled as a result of the decision to build the Daya Bay Plant?

What would their capacity have been and for how long would they have been adequate to serve Hongkong's needs?

If the Daya Bay project is delayed or cancelled, will existing power stations in Hongkong be adequate to serve Hongkong's needs in the 1990s?/

The detailed generation development plans have previously been submitted to the Government.

In the study carried out by Lazard Brothers, another consultancy Burns & Roe was employed by the Government to consider the technical aspects of the nuclear power project, including its effects on the generation development plans in Hongkong.

Castle Peak Power Station will be completed by 1990 and without an additional plant being added to the system thereafter, there will be insufficient generation capacity to meet consumer demand in the 1990s, resulting in blackouts which will be detrimental to the economy of Hongkong.

The purchase of power from the nuclear power station will be able to meet the electricity demand growth of Hongkong consumers for the period up to 1995.

If the Daya Bay project is delayed or cancelled, the existing power stations in Hongkong will not be adequate to serve Hongkong's needs in the 1990s. A new coal-fired power station will have to be built for commissioning in the early 1990s.

A coal-fired power station having a capacity equivalent to the nuclear power purchase will cost approximately HK\$17 billion, which will have to be found if this route were taken.

#### Information From Investment Company

Hong Kong HONGKONG STANDARD in English 18 Jul 86 p 24

[Text]

WRITTEN requests for information put to the Hong Kong Nuclear Investment Co by Umelco on July 7, 1986.

On behalf of members of Umelco, the Umelco office wrote to the Hongkong Nuclear Investment Co on July 7, 1986 seeking the following information:—

1. Mr Walter Patterson has said that in the event of a meltdown in a PWR all the melting core material would collect at the bottom of the pressure vessel and burn its way through the vessel and through the concrete underneath and eventually into the ground below. Radiation would then escape through craters formed by the melted core material in the ground surrounding the plant. The JVC engineers are requested to comment on this and to provide the detailed calculations supporting their comments.

2. In the event of a loss of coolant in the primary circuit of a PWR cold water would be injected into the reactor core. The JVC engineers are requested to comment on whether the containment

would be able to withstand the thermal shock caused by such an injection and to provide the detailed calculations supporting their comments.

3. The data behind the JVC engineers' statement that in the event of a worst-case hydrogen explosion in a PWR the outer containment would remain intact.

4. Comments from the JVC engineers on whether the outer containment would remain intact in the event of a steam explosion or combustion data supporting their comments.

5. Detailed data explaining the short-term and long-term radiation levels and dosages to human beings at points 10km from the plant, and in Hongkong, in the event of a worst-case accident at the Daya Bay Station with worst-case meteorological conditions in relation to Hongkong.

Answers to questions raised at the meeting on June 27, 1986 provided by the Hong Kong Nuclear Investment Co.

Question (1): What contracts have been signed (by parties concerned) on the Daya Bay Nuclear Plant Project up-

to-date?

Answer (1): Contracts (and letters of intent) signed so far:

A. Between Partners of the Power Station

• Joint Venture Contract, GNIC/HKNIC

• Electricity Off-take Contract 'A', GNPJVC/GNIC

• Electricity Off-take Contract 'B', GNPJVC/HKNIC

• Electricity Resale Contract, GNIC/HKNIC

GNPJVC: Guangdong Nuclear Power Joint Venture Company, Limited

GNIC: Guangdong Nuclear Investment Company, Limited

HKNIC: Hongkong Nuclear Investment Company, Limited

B. Between GNPJVC and other parties.

• Initial contract with EdF for preparatory engineering work prior to concluding main equipment contracts (this contract is no longer effective and had been upgraded by letter of intent for EdF Project Services Contract, see below).

• Contracts with three consultants to provide services in the assessment of bids from Framatome, GEC and EdF (these contracts are no longer

effective).

- Contract with Jilin Co (PRC) for the site formation (excavation and reclamation) work at site.

- Contract with Jilin Co for the structural excavation for the main building's foundations.

- Contract with the First Bureau of the Guangdong Power Co for the first stage breakwater on site.

- A number of small contracts (about 60 in number) for various works on site involved in establishing site services eg water, electricity supplies, temporary buildings, communications, lighting, slope protection, wharf construction and other aspects of site infrastructure.

- A number of contracts to Hong Kong and PRC organisations to undertake data collection at and in the vicinity of the site, eg meteorological, geological, hydrographic.

- Letters of Intent to Framatome (Nuclear Island and Fuel Assemblies), GEC (Conventional Island) and EdF (Project Services).

- Contract with Bechtel for Project Support Services.

- Quality Assurance services and training.

- Contracts for legal consultancy services.

Question (2): How many other contracts are yet to be signed?

Answer (2): It is impossible to give a number as contracts will arise throughout the construction period.

However the main contracts that will be signed may be summarised as follows:

- Framatome (Nuclear Island and Fuel Assemblies), GEC (Conventional Island) and EdF (Project Services) to supersede the letters of intent referred to in (1).

- Nuclear Island civil works.

- Conventional Island and balance of plant civil works.

- Other smaller civil works contracts.

- Loan Agreement with Bank of China.

- Interconnection Agreement with GNIC, HKNIC, Guangdong Power Company and China Light.

- Nuclear Island equipment erection.

- Conventional Island and balance of plant equipment erection.

- Other smaller equipment erection contracts.

- Balance of plant equipment supply contracts (about 25 in number) being peripheral equipment not included in the Framatome and GEC contracts.

- Contracts for the supply and enrichment of uranium to be used in the manufacture of nuclear fuel.

- Quality Assurance Consultancy Contract.

- Other miscellaneous contracts for specialist services, specialist staff, minor works on site, miscellaneous equipment etc.

Question (3): What contracts are expected to be signed in the next 3 months — please give approximate dates.

Answer (3): Contracts expected to be signed in the next 3 months are as follows:

- Framatome (Nuclear Island and Fuel Assemblies), GEC (Conventional Island) and EdF (Project Services) to supersede the letters of intent referred to in (1). Expected to be signed in August or September.

- Nuclear Island civil works. Expected to be signed in July or August.

- Loan Agreement with Bank of China. Expected to be signed in August.

- Interconnection Agreement with GNIC, HKNIC, Guangdong Power Company and China Light. Expected to be signed in August.

- Possibly some other miscellaneous contracts for minor work or services.

Question (4): What is the estimate of expenditure so far expended in works at the Daya Bay site.

Answer (4): Expenditure to June 30, 1986 for the whole project is about US\$90m.

- Site works Approx. 30%

- Land use fee for Daya Bay site; initial payments for FRA, GEC and EdF contracts; office facilities in Shenzhen; remuneration, etc. 50%.

Outstanding commitments at June 30, June 1986 is estimated to be US\$40m.

# Editorial: Location Seen as Wrong

Hong Kong HONGKONG STANDARD in English 18 Jul 86 p 6

[Editorial: "Getting Daya Bay Into Perspective"]

[Text] TODAY we devote three pages to some of the more important views presented at Wednesday's Legislative Council debate on the Daya Bay nuclear project. We believe this issue is vital to Hongkong's interests. And we believe people deeply interested in it should be given an opportunity to study them in full.

We also want to make it clear where we, *The Hongkong Standard*, stands on this issue. We are squarely behind China's aim to acquire nuclear technology.

But we do not believe Daya Bay is the

right place for it. It is just too close for comfort. Thirty miles may seem an immeasurably long distance to some people. But it is only twice the distance from Tsim Sha Tsui to Taipo. And only an hour's bus ride between those two points.

There is not and cannot be any absolute guarantee of safety, no matter what the experts may say. Simply because the fail-safe operator is non-existent.

And, in the worst possible scenario, there is simply no escape route for the people. How do you evacuate six million people by

sea within a couple of hours? The bottom line is we have nowhere to flee to.

Hongkong people are very concerned. They have not got themselves emotionally worked up over it. They are far too level-headed to get caught up in any mass hysteria. Otherwise there would be far more than just that one poster of a winged devil fluttered in the face of legislators on Wednesday.

They are not ignorant about the issues involved. There have been countless essays, couched in layman's language, to explain all the technical aspects of the project. In both English and Chinese. And over the electronic medium as well.

And their concern has been shown in a way never done before. No matter what some people may say to belittle the signature campaign, the million signatures is a clear indication of the groundswell of support for the anti-Deva Bay initiative.

The stress is on anti-Daya Bay. Not anti-nuclear plant. This must be made clear because the Financial Secretary, Mr Piers Jacobs, was way off mark when he talked about the credibility of the government and of Hongkong being at stake if we reneged on this agreement with China.

A few odd bods may like to see the whole deal scrapped. But we do not believe the majority of Hongkong people share this view.

All they and we, *The Hongkong Standard*, are saying to China and to the Hongkong Government is: Rethink the location.

As Shanghai and its environs are further from China's other nuclear project at Qinshan than Hongkong is from Daya Bay, it is not unreasonable to suggest that our people be given the same consideration.

That consideration is safety. Of its people and of the delicate foundation upon which Hongkong, as an international trading and financial centre, is built.

What use will there be for all the energy transmitted here from Daya Bay if people,

including potential investors, lose confidence in this place?

When that happens all the agreements signed by Mr Jacobs will not be worth the papers they're written on. And nobody will care a fig about anybody's credibility, least of all the government's.

For the six million people here it is not just a matter of confidence. It is a question of living in the shadow of a nuclear holocaust. Not for a year or two. But for decades — with the technology getting more outdated with every passing year.

But things need not come to such a pass. China can have its nuclear plant. And see its other ambitions fulfilled. We can have the energy. All these without reneging on any agreement. Without sacrificing our credibility.

It is just a matter of relocating the plant. Not as easy as it sounds, maybe. But it can be done if all the people involved in the project, from Mr Deng Xiaoping and Mr Hu Yaobang down to Mr Jack Cater and Mr Jacobs are prepared to face up to the problem squarely. So must the governments of Britain and Hongkong. And of France, too.

There is no question of loss of face. All the people involved in the project will not be held in lesser esteem for taking the concern of Hongkong people into consideration.

The issue is extremely serious. There is much more at stake than just cheaper electricity for Kowloon. It has to do with our whole future. How safe, how confident we can be in this future.

It demands rational discussions. Sober approaches. Sound arguments. It also calls for understanding of the opposing viewpoint. Some of these we got from the Legco debate on Wednesday.

In a word, getting our perspectives right. Willy-nilly, Mr Jacobs has got them wrong. There is no call to renege on the agreement. That agreement can stand. Only the name of "Daya Bay" must be changed.



HONG KONG

PAPERS REPORT ON UK AUTHORITY STUDY ON DAYA SAFETY

Concern Over Flaws

Hong Kong HONGKONG STANDARD in English 28 Jul 86 pp 1, 22

[Article by Sheila Dawes]

[Text]

**THE Hongkong Government is privately alarmed by disturbing figures and serious gaps in a British safety study of the Guangdong nuclear power station project, according to *The Observer* newspaper.**

The London newspaper claimed to have obtained confidential documents which revealed that the study carried out by the United Kingdom Atomic Energy Authority (UKAEA) at Harwell failed to reveal risks.

Subsequent correspondence shows that the Hongkong authorities are extremely worried about the safety of the Daya Bay reactors, *The Observer* claims.

As part of its attempt to calm public fears about the reactors' safety, the Hongkong Government commissioned the still unpublished Harwell assessment report from Britain. It was delivered earlier this year.

The newspaper claimed that the correspondence which followed showed the Hongkong Government's disquiet and stated that the study was purely theoretical and failed to answer key questions about the reactors' safety.

The study also "puts the risk of a serious nuclear accident at around one in 300." The Government feels that this is not "particularly reassuring."

The Harwell report "misses key environmental factors that would raise these risks even further and assumes that an evacuation of Hongkong would be possible after a serious nuclear accident — although the overcrowded city is almost surrounded by sea", the newspaper reported the Government as saying.

It also "fails to take into account any lessons learned after the Chernobyl disaster and lacks any authentic French design information," said *The Observer* in elaborating the Government's doubts.

The newspaper said Harwell also offered advice on the public presentation of the more unwelcome statistics which has shed revealing light on British practices.

The atomic energy authority showed how figures could be turned into incomprehensible scientific jargon, or simply omitted from the text and buried in tables, *The Observer* alleged.

"A British safety expert shown the UKAEA report, titled *Daya Bay Nuclear Power Station: Accident*

*Analysis Phase One*, said it was of "very little scientific value."

"It simply assumes, without any supporting analysis, that the risk of an accident is similar to that predicted for US and European reactors."

"It then applies a crude analysis to estimate the consequences for Hongkong residents."

"But no mention is made of the uncertainties involved in such calculations which by any standards are enormous. In addition, the figures quoted in the report are said to 'reflect international experience', but this is wrong. They are merely theoretical estimates taken from other studies," he said.

Other criticisms of the atomic authority's work quoted by the newspaper included those made by Hongkong's Director of Electrical and Mechanical Services, Mr Graham Osborne.

He is reported to have said he was "amazed" that the British authorities made no reference to Chernobyl in subsequent correspondence with the Hongkong authorities.

Two major assumptions of the report had been altered by the Chernobyl disaster.



First, the report assumed that in the event of a reactor accident, a release of radioactivity would be limited to 10 hours. At Chernobyl it lasted four days.

The study also assumed an accident would occur in "constant weather".

In other words, the wind direction and speed would not change during the accident, or rainfall commence.

Put at Chernobyl, radioactivity was spread not just downwind, but in all directions around the reactor for hundreds of miles.

Lamb sales were banned as far away as Britain and Switzerland and milk contaminated.

The Harwell report said a serious accident could have "significant consequences for the colony", but its probability was only one in 20,000 per reactor, *The Observer* said.

It claimed that Mr Osborne, on February 7 this year, told the Hong-kong Secretary for Economic Services: "I rather doubt if the layman would find it particularly reassuring bearing in mind there are two reactors and the life of the station is expected to be 30 years, the chance of a severe accident during the lifetime of the station becomes only one in 333."

The paper said that later Harwell agreed that adding "external hazards" such as

plane crashes and tornadoes would at least further halve these odds.

Harwell also agreed its reassuring radiation dose figures after an accident assumed "fairly large numbers of people" would be evacuated, *The Observer* said.

It quotes Mr Osborne's reactions that: "Evacuation is not a viable option for Hongkong."

He added: "The possibility, however remote, that there could be over 1,000 early deaths arising from an accident does not inspire confidence, especially as the statement is silent on ...delayed fatal cancer... I must confess the overall risks are higher than I expected."

The paper reported that Mr Osborne said in a confidential memo dated May 15, that Harwell's warning worried him, and quotes him as saying: "Take it that we have still not had a reply to our telex to London asking how the price reduction was achieved."

"We have in the past two weeks made a lot of reassuring statements...but as far as I am aware, nobody in the Government has seen in writing the facts on which these statements are based."

The UKAEA yesterday refused to comment about the report, *The Observer* said.

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THE possibility, however remote, that there could be over 1,000 early deaths arising from an accident does not inspire confidence, especially as the statement is silent on ...delayed fatal cancer...I must confess the overall risks are higher than I expected...

...I rather doubt if the layman would find it particularly reassuring (that) the chance of a severe accident during the lifetime of the (Daya Bay nuclear) station becomes only one in 333.

LONDON'S *Observer* newspaper quoting Hongkong's Director of Electrical and Mechanical Services Graham Osborne to the UK atomic authority's report on Daya Bay.

## DAYASPEAK

LONDON: According to *The Observer*, the Hongkong Government sought help from the United Kingdom Atomic Energy Authority in the "presentation" of the Harwell report.

The reply was a list of proposed changes to remarks which might be presented "out of context", the paper alleges.

The paper said that one, for example read: "Replace 'about a third of severe accidents would result in some cases of fatal cancer' by 'the conditional probability of the occurrence of one or more cases of fatal cancer, given a (very unlikely) severe accident as defined in this study, is about 0.34'."

The paper said that Harwell added: "If it is considered the above statements as amended are still open to misconstruction ...they may, of course be deleted entirely without loss of information (which is all in the tables and figures)."

## Daya Bay worry dismissed by London

THE British Government believes the anxiety in Hongkong about the safety aspects of the Daya Bay nuclear plant misplaced.

It is out to calm fears of an emotional tone of discussion.

A series of written replies to a series of written questions from the Committee of Enquiry into the

OUR report on Saturday by special London correspondent John

Warden who described the British

Government dismissing Hongkong fears over the nuclear project as 'misplaced'.

Hong Kong Official's Comment

Hong Kong HONGKONG STANDARD in English 30 Jul 86 p 1

[Article by Katherine Saltzstein]

[Text]

A GOVERNMENT official yesterday asked for a more comprehensive study of Daya Bay by the United Kingdom Atomic Energy Authority (UKAEA), while a member of the Legislative Council called for an independent third party to look at the proposed nuclear power plant.

Mr John Yaxley, Secretary for Economic Services, said in a press statement that the UKAEA at Harwell, commissioned by the Hongkong Government to study the plant, should take a closer look at the specific characteristics of Daya Bay.

The UKAEA also authored the feasibility study of the plant undertaken five years ago and released in Hongkong this week.

Mr Yaxley criticised the authority's most recent report, saying that the preliminary accident assessment was based on safety studies of reactors elsewhere in the world, and did

not consider all features of the proposed Daya Bay plant.

He suggested that the study encompass specific features of pressurised water reactors — the type to be built at Daya Bay. Also, other factors, including meteorology, topography, and demography of the area should be looked at, he said.

Mr Yaxley returned recently after meeting with UKAEA officials who agreed to expand stage II of the accident assessment study to make it more relevant to the Daya Bay plant and site.

A team of officials will soon travel to Harwell to consult UKAEA officials on the details. The final report will be made public, he said.

UKAEA recently issued a preliminary report on contingency planning for the plant.

Meanwhile, Legislative Councillor, Mr Poon Chi-fai, said he would propose at a Legco in-house meeting that an independent investigation "by a neutral third party" be conducted.

He criticised the joint venture company working on the project for not releasing more information.

### Report Deemed Outdated

Hong Kong SOUTH CHINA MORNING POST in English 1 Aug 86 pp 1, 2

[Article by Albert Chan]

[Excerpt]

A BRITISH experts' report on how the Government should devise a strategy to promote nuclear energy in Hongkong has become outdated even before any of its recommendations are implemented.

The report, entitled *A Public Education Strategy*, was completed in October last year as part of a \$2.1 million consultancy package commissioned by the Hongkong Government.

Probably the most ironic statement in the report - in the light of recent events - was the concluding paragraph in the summary which said: "To date, there has been no significant hostility to the project."

The report also said Hongkong newspapers "seem to be supportive of the authorities and have taken a positive approach to the Daya Bay project, stressing its benefits to Hongkong" while most people in Hongkong "have a traditional respect for authority."

Adds the report: "The British tend to disbelieve and mistrust 'official' statements and be rather contemptuous of those in authority. The Chinese tradition tends to be the opposite."

The experts therefore came to the conclusion that promoting nuclear energy and the Daya Bay project to the people of Hongkong would not be a difficult task.

The experts said the Government should tell the public that the Daya Bay nuclear project was a *fait accompli* and that it was "symbolic" of the political settlement between Britain and China on the 1997 problem.

It said "most sections of the local community can identify some benefit in the project."

The "benefit" seen by the Hongkong Government would be that it "cements the political agreement."

It said: "The agreement to proceed with the Daya Bay project as a joint venture can be seen as consistent with this arrangement and to be supportive and even symbolic of it."

"Indeed, it is difficult to identify a constituency in the Hongkong political spectrum in which hostility to the project could take root."

Even before the Government starts to implement any of the recommendations - which include promotional documentaries on television and nuclear lessons in schools - the report has become outdated because of the Chernobyl accident.

After the Soviet disaster and a huge local anti-nuclear campaign in recent months, the Government has conceded that the situation has changed substantially.

The Government is therefore undertaking a fresh review of the recommendations made by the British experts, and has no idea when such a public education program will be implemented.

A prophetic statement from the report said: "It is important to make a start on the program as soon as possible. Although one would not reasonably expect the appearance of a virulent anti-nuclear movement in Hongkong ... it would be unwise to rule out that possibility."

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HONG KONG

## PAPERS REPORT ON DAYA BAY FEASIBILITY REPORT

### POST Reviews Content

Hong Kong SOUTH CHINA SUNDAY MORNING POST in English 27 Jul 86 pp 1, 2

[Article by Ann Quon]

[Text]

THE long-awaited feasibility report on the Daya Bay nuclear plant, due to be released to Legislative Councillors tomorrow, contains little information on safety and no reference to contingency measures in the event of a major nuclear accident.

The report, which has been seen by the *Sunday Morning Post*, is bound to upset those seeking assurances about the plant's safety aspects.

Throughout the five-volume report, of which only three volumes will be made available to councillors, there are few mentions of safety.

It fails to address issues such as safety procedures to follow in the event of an accident and lacks any contingency plan or evacuation procedure.

Nor does it make specific recommendations on any of these issues, which have become the cornerstone of the current nuclear debate.

Instead, safety for the plant is simply cited as the responsibility of the joint venture company in charge of the project, the Guangdong Nuclear Power Joint Venture Company and the Chinese Government.

Because Daya Bay had yet to be chosen as the site of the plant when the study was completed in 1980, reference is made throughout to the more general term, the Guangdong nuclear power station.

On safety, the report says: "The safety standards adopted will be those appropriate to the Guangdong nuclear power station."

"These will include existing regulations related to Chinese fossil-fuelled power stations, the Environmental Protection Law (draft) and the radiation protection regulations of the People's Republic of China."

"In addition, safety standards for the design, construction and operation of the nuclear power plant in Guangdong will be formulated in the light of relevant experience in other countries."

The report adds that the joint utility is to take charge of the plant's safety under the "guidance and inspection of the relevant authorities of the People's Republic of China".

Despite the failure to be specific about the course of its safety program, the report does acknowledge that "because of the participation of China Light and Power and the Guangdong Power Company in the project, it is important to give sufficient consideration to the concerns about nuclear power plant safety expressed in Hongkong and Guangdong."

However, sources last night indicated that, because the report was completed before the design of the plant was decided upon, it would have been difficult to draft contingency plans.

The report, which is otherwise highly technical, is likely to go over the heads of most legislative councillors because of the detail paid to statistical and geological information.

Nevertheless, its release comes at a time when councillors have been pressing for more information about Daya Bay in the face of mounting opposition to the plant, which is to be built only 50 kilometres from Hongkong.

In what is seen as an attempt to allay fears about the safety and commercial viability of the plant, pressure was applied by the Government on the Hongkong Nuclear Investment Company, the Hongkong partner in the joint venture to release the study.

The report should be ready for distribution to councillors tomorrow. However, it is expected to fall well short of expectations.

This is because, not only is information relating to safety far from detailed, but a separate and vital report dealing with the economic viability of the plant is being withheld.

What councillors will get instead, is a series of reports consisting largely of charts, graphs and maps as well as detailed technical data.

Another factor that will disappoint councillors is that the report is based on studies completed six years ago. Completed in December 1980, it offers options and no hard and fast recommendations in areas like equipment or station design.

The three studies to be handed over to councillors will cover system design, equipment study and site selection.

The last study has been broken into three volumes and includes two separate site selection studies as well as an appendix. The initial site selection study was completed in 1980, but replaced by a second study carried out two years later.

This was because two of the sites around Daya Bay, at Thun Yang and Pong Shan, which were seen as feasible during the earlier study, had been shelved.



The reasons given had nothing to do with geological considerations, but because "both Thun Yang and Pong Shan were at variance with the development of Shenzhen and national construction."

There are also indications in the report that Beijing felt the "seismic and geological work initially carried out was insufficient in detail and scope".

The report also reveals that in January 1981 the Joint Selection Committee of the Guangdong Power Company and China Light and Power looked into the feasibility of building a plant at Mira Bay near Hongkong.

It found that Mira Bay was not only suitable, but situated in a stable geological location and considered safe. However, the proposal was rejected by China Light and Power because of concern that it was too close to Hongkong.

Another site at Xia Sha, although suitable, was also turned down because it faced Peng Chau Island.

As a result, it concluded that Daya Bay (or Da Keng as it is called in the report) was the "most suitable, Ling Jiao Shi was the next most suitable, while there were problems in Xia Sha."

The sites at Ling Ao, and Chang Xui Jiao were rejected because of their proximity to geological fault lines.

The report, which has been vetted by Chinese authorities, will have some parts censored as state secrets with a note in the front of each volume explaining why certain parts have been excluded.

What councillors won't get to see include maps, diagrams and charts.

These will be blacked out with the wording "PRC state secret. No authority to reproduce" slashed across the page.

In agreeing to release the report, Beijing has indicated that it does not wish to make public parts of the report which contain material that is considered either sensitive commercially or strategically important to the country.

It is believed the latter covers details of mineral and metallurgical reserves in southern Guangdong.

Censored completely will be what are considered the two most controversial studies in the feasibility study.

These include the summary and economic reports, which contain all the commercial information relevant to Daya Bay such as the projected price of nuclear fuel as opposed to conventional fuel costs and equipment cost breakdowns.

Without these reports, it is unlikely that an assessment can be made on the commercial viability of the project at a time when power produced by conventional means is looking increasingly attractive due to low fuel costs, although projections are that they will rise by the time the plant comes on stream in 1992.

The safety assessment of Daya Bay is contained in the 67-page volume on equipment safety.

Also included are assessments of different types of reactors, and turbine generators as well as quality assurance procedures, decommissioning of the plant and the treatment of effluent.

On the crucial issue of the type of reactor to be used at Daya Bay, the report says that the final choice will be made "on economic

ie, political or contractual grounds and not technical grounds."

One of the most technical reports in the series is on system design. The report examines unit and station capacity for generating power as well as the types of transmission networks for connection of the station and the principles of system operations and despatch.

The feasibility study was commissioned by the Guangdong Nuclear Power Joint Venture Company, which is owned 75 per cent by the Guangdong Nuclear Investment Company and 25 per cent by the Hongkong Nuclear Investment Company, a subsidiary of Hongkong's largest power utility, China Light and Power.

When contacted by the *Sunday Morning Post* yesterday, the Secretary for Economic Services, Mr John Yaxley, declined to comment on the contents of the report.

However, he did confirm that it would be released to Legislative Councillors tomorrow and that two of the five volumes would be withheld.

"Things like geographical features don't change, but the commercial aspects do. I have no doubt that the two companies and the joint venture company are looking at revised financial projections," he said.

A decision has yet to be made on whether the feasibility study will be made available to the public, although it is likely to be released to the news media once councillors have had a chance to read through each of the telephone directory-size reports.

### Study Called Useless

Hong Kong SOUTH CHINA MORNING POST in English 28 Jul 86 pp 1, 2

[Article by Albert Chan]

[Text] TOP officials involved in the Daya Bay nuclear project said yesterday that parts of the feasibility report to be released this week were "useless," "irrelevant" and "superficial."

The public should press the Government to release the Lazard Brothers report, a merchant banking study on the controversial project, they told the *South China Morning Post*.

The officials asked not to be named but include directors and executives of the Guangdong Nuclear Power Joint Venture Co (JVC) and engineers from the mainland and the China Light and Power Co.

They said the five-part feasibility study had been done six years ago and much of the information was out of date.

One example was the equipment study section which examined the various types of nuclear reactors available.

"In 1979 when the report was done, Framatome emerged as the best choice. Westinghouse has since produced a more superior design," said one engineer.

Another official described the equipment study as

"superficial" because it contained information from brochures supplied by the various equipment suppliers.

At the time of the report, it had not been decided which reactor manufacturer would be chosen and potential vendors would have been reluctant to release too many technical specifications, he said.

The officials agreed that by keeping confidential the vital part of the report dealing with the economics of Daya Bay, the Government would leave a significant vacuum in the public's understanding of the project.

But even the economic study was out of date, they said.

Reliable sources said the JVC, and China Light in particular, had agreed to release the report only after pressure from the Hongkong Government and persuasion by Financial Secretary Piers Jacobs.

However, one JVC director said: "What could really shed light on the project is the Lazard Brothers report which deals with the financial and economics aspects."

"The public should press the Government to release this rather than pursuing our outdated feasibility study."

Neither China Light nor the Chinese authorities were allowed to see the Lazard Brothers report, which was commissioned by the Government several years ago to examine the economic justification of Daya Bay.

Legislative Councillor Miss Maria Tam said yesterday her understanding was that the Lazard Brothers report was written with confidential information supplied by China Light and that the Government could not release it without the power company's approval.

She said she would clear the matter with China Light and the Government before pressing for the report's disclosure.

As for the feasibility study, two of its five parts are to be kept from the Legislative Councillors and public. The first is a summary of the study and the other examines economic aspects.

As the *Post* reported last week, the Chinese authorities have further censored the public version by withholding geological and metallurgical information on southern Guangdong, including maps and photographs.

It has now been learned

that all the figures and dollar signs will also be blacked out.

The three parts to be made public this week are the system design report, the equipment study report and the site selection report.

Sources said the system design report, which contains information about power systems and forecasts for Hongkong and Guangdong province, would be edited before release because some parts were "economically sensitive."

The site selection report comprises three volumes, each the size of a telephone directory.

The first two volumes are 1980 and 1982 site selection studies. The third contains geological details and will be totally withheld.

This leaves the equipment study report as the only one which will be fully disclosed.

China Light and Power Co has been given the tedious job of making 50 photocopied sets of the study with censored material deleted.

The 50 sets, which literally need a lorry and several workmen to deliver, will reach Umelco today or tomorrow.

## Expense of Shutdown

Hong Kong SOUTH CHINA MORNING POST in English 28 Jul 86 p 1

[Text] ABOUT \$2.7 billion will be needed for the decommissioning of the Daya Bay nuclear plant, which is about 10 per cent of the total cost of building it.

This estimated figure is contained in part three of the feasibility report which deals with equipment study for the nuclear plant.

The report recommended that a special fund be set up when the plant comes into operation and that a certain amount be assigned each year so that when the plant needs to be decommissioned, the huge amount would be ready.

The annual amount would be calculated as the annual operational cost for the plant.

As for the exact amount needed for decommissioning, the report only said: "For the purpose of planning the project, it may be assumed that cost of decommissioning will be 10 per cent of the construction of the plant."

The cost of the plant at today's estimate is around HK\$27 billion inclusive of interest which means the cost for decommissioning should be about HK\$2.7 billion.

With the expected life of the Daya Bay station put at 30 years, the joint venture company would have to put up about \$90 million per year.

The report said the plant may have to be decommissioned if "a major accident" rendered it uneconomic to repair.

But it did not say where the money would come from if that happened after only a few years of operation.

The \$2.7 billion would be used to decommission the plant in three stages, said the report.

The first would involve the discharge of fuel from the reactor and other procedures and would take up to three years to complete.

This would be done once the plant was totally shut down and measures taken to ensure contamination was reduced.

The second stage would take up to 10 years and involve reducing the operational size of the plant to a minimum.

The third and final stage could take as long as 100 years to complete because it involved the delicate problem of reducing the effectiveness of highly radioactive substances because of their long half-life.

But the report noted that "experience in decommissioning of pressurised water reactors is limited" because few have reached the end of their working lives.

### Quake Damage Unlikely

Hong Kong SOUTH CHINA MORNING POST in English 29 Jul 86 p 5

[Text]

THE site of the proposed Daya Bay Nuclear Power Plant is in China's earthquake zone, but earthquakes "are infrequent and moderate," according to a 1980 feasibility study.

The comprehensive report, which includes several diagrams and graphs, was released to Umeico and the press yesterday.

In a chapter on site selection, the authors say they narrowed the number of sites to three, none of which was selected.

Two of the sites discussed in detail, Dong Shan and Hu Tou Jiao, are near Daya Bay.

At least six graphs in the report, including one on the distribution of earthquake epicentres in Guangdong province are blank with the words "PRC state secret; no authority to reproduce." Daya Bay is within Guangdong province.

The first earthquake recorded in the area occurred in 1067, the report says. There have been a total of 11 earthquakes since then, each with a magnitude of six and above on the Richter scale.

The largest earthquake recorded in the coastal region was in 1604, more than 550 kilometres away from the three sites.

The report states that earthquake activity in this region is "moderately strong" yet "comparatively less than in a medium level activity zone."

The report states that the inhabitants in the Daya Bay area are engaged in agriculture and there are no dairy or chicken farms.

Therefore, the report concludes: "It is improbable that contamination through the biological cycle will occur and the subsequent absorption into human bodies through the food cycle."

The report also says that Daya Bay is a breeding ground for fish and oysters. There are two agriculture and three fishery communes and two national pearl breeding grounds.

The study says the proposed nuclear power plant will hardly affect the abundant marine life in Daya Bay.

"It is rich in marine life, and the fish breed and grow in Daya Bay," the study says. "The shallow coastline along Daya Bay is one of the best shrimp spawning grounds."

There is also an abundance of shell fish along the shore including pearl clams, jade clams, abalone and snails.

But, the authors say: "It is estimated that hot water released from the power station will affect only a limited area of 3 to 3.5 kilometres and thus have limited effect on the entire bay. The waste water to the sea will have little environmental impact."

# On-Site Waste Storage

Hong Kong HONGKONG STANDARD in English 29 Jul 86 p 5

[Text]

STORAGE of highly-radioactive nuclear waste from the Daya Bay nuclear power plant was recommended to be located on site, according to the 1980 Equipment Study Report of the Daya Bay Feasibility Study.

The report is among three volumes of the feasibility study made public yesterday.

The report stated there was no existing (nuclear) disposal site in the People's Republic of China and a site had yet to be determined. It recommended the construction of a storage building on site at Daya Bay to accommodate up to 10 years' waste.

The storage area must provide sufficient space for

the emergency discharge of the entire reactor core, the report added.

The two 900 megawatt reactors to be built at Daya Bay would normally produce 51 tonnes of spent fuel each year which would be composed of 0.9 percent Uranium 235 and approximately 14 kilograms of Plutonium.

Plutonium and Uranium 235 are recoverable through reprocessing and, the report says, this will form part of the overall Chinese national nuclear plan which at the time of the report was not yet finalised.

Solid nuclear waste from the plant would fall into two categories: namely low-level and medium-level waste.

## Hong Kong Scientist's Comment

Hong Kong HONGKONG STANDARD in English 2 Aug 86 p 5

[Text]

A LEADING local scientist said yesterday that the safety standards revealed in the feasibility report of the Daya Bay nuclear project are on a par with international requirements.

The acting director of the Hong Kong University Radioisotope Unit, Dr Man-Yin Wong Tso, told reporters after a seminar on nuclear power that she believes the study is reliable.

The study, which was conducted six years ago, takes 0.15 rem as the dose of radiation that a person can endure within a 30-km range of the power station under emergency situation.

Dr Tso noted that the permissible level set by the

International Commission of Radiological Protection, a sister set-up of the International Atomic Energy Agency based in Vienna, is 25 rem.

Some people might have confused the figure with the US federal regulation on the permissible level under ordinary circumstances, which is 0.0025 rem.

The permissible level for building a nuclear station is different from the normal day-to-day situation, Dr Tso said.

The convenor of the anti-nuclear coalition, the Rev Fung Chi-wood, had earlier criticised the safety standard as being four times lower than that currently in use in the US.

The report also assumes that, if the worst comes to the worst, the Daya Bay installation will lead to 1,000 to 10,000 curies of radioactive contamination.

Dr Tso pointed out that even in the 1979 Three Mile Island case — the worst accident that has ever happened to a pressurised water reactor — the radiation level only reached 15 curies.

Meanwhile, the Chinese Nuclear Power Industry Minister, Mr Jiang Xin-xiong, said China would follow the guideline of "safety and quality first".

The minister called for more safety regulations and said China would introduce comprehensive quality control systems.

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CSO: 5150/0157

HONG KONG

# GOVERNOR RULES OUT REFERENDUM ON DAYA BAY

Hong Kong SOUTH CHINA MORNING POST in English 4 Aug 86 p 1

[Text]

THE Acting Governor, Sir David Akers-Jones, yesterday ruled out holding a referendum on whether the nuclear plant planned for Daya Bay in China should be built.

"I don't think you can decide things like this by referendum. It's not a satisfactory way of dealing with such a complicated subject, really," he said.

He stressed that since the plant would not be built in Hongkong, it was not for Hongkong people to decide whether it should be built.

The idea of a referendum was mooted by some Legislative Councillors recently.

Sir David said two delegations of Legislative Council members had just gone abroad on a fact-finding mission and it would be inappropriate to jump to any conclusion on the subject before they return.

He disagreed with a suggestion that the delegations would only collect positive

data on nuclear energy, saying that the members would visit Austria where the anti-nuclear sentiment was high.

Sir David said he believed the councillors would be able to complete a report before next month when the contracts for the Daya Bay plant were scheduled to be signed.

● Sir David was also asked about Legco members' suggestions that the number of Officials, which was reduced after indirect elections were introduced last year, should be increased.

He said the Government was aware that during the last session Official members on the council, who had to take questions covering a number of policy areas, were not specifically versed in answering supplementary questions.

Sir David said the Government would gauge the views of the Unofficials before deciding whether more Officials should sit on the council.

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CSO: 5150/0160



HONG KONG

## PAPERS REPORT PRC DECISION ON DAYA BAY CONSTRUCTION

### Venture To Proceed

Hong Kong HONGKONG STANDARD in English 29 Jul 86 pp 1, 24

[Article by David Wong]

[Text]

**CHINA** has decided to go ahead with its Daya Bay nuclear project, despite local alarm and protests, and will sign the remaining contracts a month ahead of schedule.

The decision is reported in the latest issue of *Outlook Weekly*, an influential publication reflecting the views of Chinese leaders. Quoting no sources, the report says China will proceed with the project, regardless of protests against it.

The decision was made recently in spite of mounting pressure from the people of Hongkong asking that the controversial plant be relocated away from the territory, according to diplomatic sources.

As a result, Umelco's fact-finding missions to Europe and the United States will have only one instead of six weeks to complete their reports, sources said.

The *Standard* understands that the Chinese

government recently held a top-level meeting in Beijing to appraise the project and re-examine China's position on the matter. It has developed into a highly sensitive political issue.

The meeting was chaired by Vice-Premier, Mr Li Peng, and attended by top officials involved in the multi-billion dollar plant.

The date and venue of the meeting were kept top-secret, but the *Standard* learns it was held about two weeks ago.

Among those present were government ministers, including the Minister of Nuclear Industry, officials of the Guangdong Nuclear Power Joint Venture Company (JVC) and officials from other government departments concerned, a diplomatic source said.

It is understood that a senior official of the local Xinhua news agency was also present, but his identity is not yet known.

After the meeting, Mr Li met with the British and French ambassadors in Beijing to inform them of China's decision.

British and France are both major suppliers of key

components for the project, including the reactors and other elements of the infrastructure.

This latest development means that China is taking a firm line on its original plan to build the nuclear plant at Daya Bay, and is not bowing to pressure from local anti-nuclear plant groups who want the plant relocated.

The meeting also gave the Guangdong Joint Venture Company the green light to proceed with their original plans without delay, sources said.

Contracts to this end will be signed in September. The signing date was originally to have been postponed. Construction has already fallen far behind schedule because of the unduly lengthy negotiations.

The *Standard* understands that if the project were scrapped, termination fees and other compensation could cost up to \$390 million (US\$50 million). This is not including the \$1,014 million (US\$130 million) already spent up to the end of June this year.

Despite the firm stand taken by the Chinese government in the matter, it

was agreed at the Beijing meeting that there was an immediate need to help the Hongkong public understand the implications of the nuclear plant better and allay needless fears.

This explains why China is now willing to permit local legislators to read the confidential feasibility study made on the project.

It is understood that both the British and French governments were anxious whether China would go ahead with the project in view of local opposition.

After the British ambassador in Beijing was told of the decision, London informed the Hongkong Government.

Sources said that when Chief Secretary, Sir David Akers-Jones, made a relatively strong statement on July 17 declaring that Hongkong was unable to withdraw from the project, it was clear that he had already been informed of China's latest position.

It is understood that the Chinese government now wishes to give Hongkong

access to as much information about the project as possible, except data relating to sensitive commercial secrets.

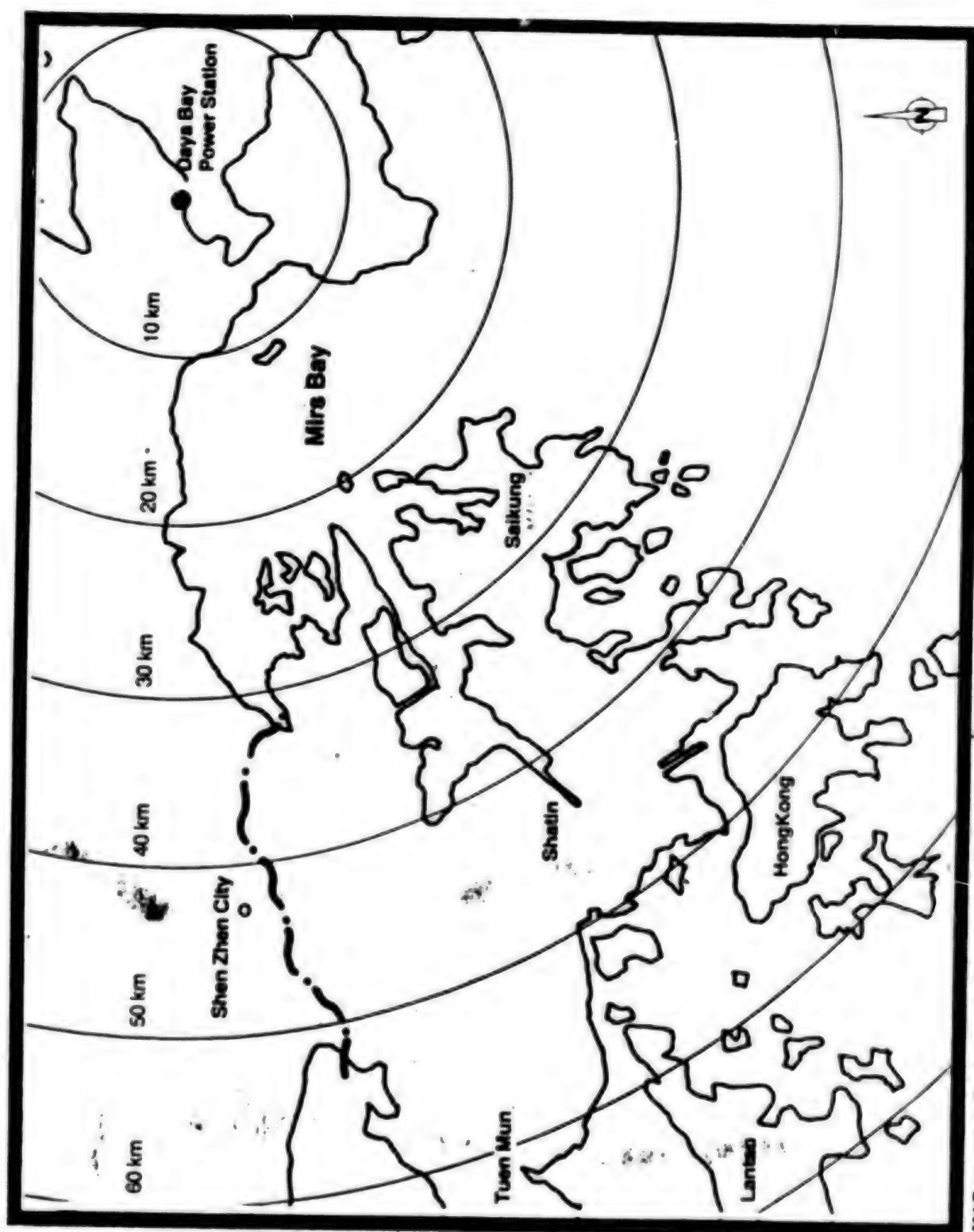
The government was earlier strict about keeping the reports to itself.

It has also stepped up its propaganda to give the public a better understanding of nuclear energy and its importance, and how safe it is with the advanced technology now available.

The China News Service and leftwing newspapers here have recently interviewed nuclear scientists, local and foreign, and given extensive coverage to the "positive" aspects of nuclear technology.

"One of the first questions to ask the public is whether it can tell the difference between a nuclear bomb and a nuclear electricity plant?" a source commented.

"Most people don't realise the basic difference. Their instant fears arise chiefly out of ignorance," he added.



MAP showing the location of the Daya Bay plant in relation to the territory.

## No Role for Hong Kong

Hong Kong SOUTH CHINA MORNING POST in English 30 Jul 86 p 10

[Text]

THERE is little likelihood that Hongkong will have a role in the supervision of the nuclear plant at Daya Bay which is scheduled to be in operation by 1993.

There has been no official indication that China will accede to a request from certain quarters in the territory that some Hongkong specialists should join a supervisory body to be set up to look into safety aspects of the plant, 50 km from Hongkong Island.

As far as is known, China has sidestepped the proposal, stressing instead the meticulous planning and comprehensive system of supervision devised by the parties involved - France and China.

And over the past few days the signals from China have been to the effect that construction of the plant will definitely go ahead.

These signals and veiled messages have appeared in the leftwing press and through sources close to the Chinese authorities. The latest edition of the prestigious magazine *Outlook* categorically states that it would be a total fallacy to suggest that the Chinese authorities might reconsider the project at Daya Bay.

One authoritative source also said that there would be no change in the plans for Daya Bay unless there were "compelling reasons."

So far, few Hongkong people if any have been able to argue convincingly that the plant would not be safe and

would indeed pose a serious threat to the territory. On the contrary, China has repeatedly stressed the safety factors in the design and administration of the nuclear plant, supporting the assurances with statistics on the safety of water-polluted plants.

These statements have come as the campaign by local people opposed to the concept has culminated in a million-signature campaign and the decision to go to Beijing to present their views.

The campaign is viewed by many as having a significance beyond the current controversy. Some believe it could be the sign of a new element in the fledgling political development of Hongkong.

A source close to China said that, although the plant was definitely to be built, the task ahead was to acquaint the Hongkong people with all its aspects. It was with this in mind, said the source, that China gave approval to the publication of a report on the plant that shed much new light on the technical details and safety aspects of the venture.

The report (aside for the section dealing with financial matters) should do much to eliminate the fears and anxieties of local people but it needed to be fully digested and explained in layman's terms, the source said.

However, it remained to be seen whether China would agree to the suggestion that qualified and respected Hongkong specialists be included in the monitoring and

supervision of the plant at Daya Bay.

Present arrangements, as disclosed by reliable sources, called for the management of the plant to be headed by the French and only after five years of operation would the Chinese take over the leading role, with the French acting as subordinates.

Such arrangements are considered to be adequate to ensure the safe running of the plant. This being the case, it is reasoned, there is little need for third parties to be involved.

Other sources note that the China Light and Power Company, which is also involved in the plant, may have its engineers there. Thus, to a certain extent, it may be said that Hongkong is involved, if only in a very small way.

As for the possibility of contamination in Hongkong should an accident occur, sources pointed out that China was planning another nuclear power plant in Qinshan, about 50 km from the centre of the vast municipality of Shanghai.

When the blueprint for the Qinshan plant was first made known, there were similar fears and apprehensions by the 10 million people of Shanghai. A series of meetings was held at which scientists, environmentalists and other members of the community discussed the pros and cons of the project. After thorough debate, the objections, due largely to ignorance of the true implications of the plant, were withdrawn.

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HONG KONG

## TOUR OF DAYA FACTFINDING DELEGATION REPORTED

### Purpose of Tour

Hong Kong SOUTH CHINA MORNING POST in English 2 Aug 86 p 1

[Article by Albert Chan]

[Text]

THE Legislative Council's overseas nuclear fact-finding delegations will make no judgments on whether the Daya Bay nuclear project should be built or not.

On the eve of their departure to Europe, America and Japan, the leader of one of the groups, Mr Allen Lee, said: "I don't think we have the expertise to make a judgment. I don't think it is up to us to convince the Hongkong people whether Daya Bay is safe or not."

Delegates participating in the tour, which will cost taxpayers \$200,000, will compile a report after they return.

The leader of the other group, Legco member Miss Maria Tam, added: "Our mission is to seek expert assessment of the information put to us, to verify the facts and report to the Legislative Council and the people of Hongkong."

She said the purposes of the trips was to:

- Assess the operating and maintenance requirements in plants similar to the Daya Bay project and the risks associated with such plants.

- Find out what contingency plans are necessary for densely populated areas 50 km away from nuclear stations.

- Obtain information from the International Atomic Energy Commission and other recognised authorities on the standards and requirements for operating a nuclear station and what advice they could offer on the monitoring of radiation.

Miss Tam said the group going to Europe also wanted to find out what kind of training Chinese engineers will receive and how China will comply with international safety standards.

The delegation will be armed with 200 questions supplied by a wide spectrum of the public including pressure groups, individuals, anti-nuclear lobbyists, nuclear power experts and officials involved with the project.

Miss Tam will leave for Europe tonight with a group of five, while Mr Lee's group of five leaves for a six-day trip to the United States tomorrow.

The United States delegation will round off their visit by spending three days in Tokyo, and will be joined by several members of the European group plus two other Unofficials from Hongkong.

Mr Lee stressed that Japan was important because it was the only country that has experienced a nuclear attack and still launched a nuclear energy program.

"We would try to find out why they have made such decisions at the government level," he said.

On criticisms that the visit will be dominated by meetings with pro-nuclear officials from the nuclear industry, Miss Tam argued that she hoped a trip to pro-nuclear France will be balanced by a trip to Austria.

"What we will see in France may be pro-nuclear but since Austria, as a matter of policy, is against nuclear plants, we hope what we're going to see there will not only be neutral but also give us the other side of the story," Miss Tam said.

Mr Lee said the United States delegation will meet a lobbying group based near the Three Mile Island nuclear reactor which will most likely be anti-nuclear.



## Visit to Three-Mile Island

Hong Kong SOUTH CHINA SUNDAY MORNING POST in English 3 Aug 86 p 3

[Article by Ann Quon]

[Text]

RESIDENTS living near the Three Mile Island nuclear power plant have told a legislative councillor that they are horrified about the decision to build a nuclear plant near Hongkong.

"They were shocked that Daya Bay is going to be built so close to a population of over five million," said Mr Szeto Wah of his visit to Harrisburg, Pennsylvania last week.

Harrisburg is less than 25 km from Three Mile Island, the scene of the worst nuclear accident in the history of the United States nuclear program.

During the accident, which occurred in March 1979, the uranium core of the reactor severely overheated and a quantity of radioactive material was released into the atmosphere, forcing the evacuation of those in the immediate vicinity of the plant. Increased levels of radiation were reported in the area both during and after the incident and the cause was blamed on human and mechanical error.

Mr Szeto is presently on a month-long tour of the United States arranged by the American Federation of Teachers. Because of increased concern in Hongkong over the Daya Bay nuclear reactor, which is to be built only 50 km from downtown Hongkong, Mr Szeto has included in his trip visits to various nuclear installations.

According to Mr Szeto, after the accident at Three Mile Island, fears about radiation and the possibility of another accident forced many residents to move out of Harrisburg, and real

estate values, which plunged because of the exodus, have yet to recover.

Mr Szeto visited the plant last week because, like the proposed Daya Bay plant, it uses pressurised water reactors.

However only one of the two reactors is fully operational. The second reactor was shut down permanently after the accident.

Although Mr Szeto is opposed to nuclear generated power, he says his nuclear fact-finding mission is useful and that the authorities have been helpful in providing him with information.

"They have been completely open and try to provide as much information as they can to the public in the form of pamphlets. They also emphasise the dangers involved and try to impress on the public ways they can protect themselves in the event of a radiation leak or a full-scale accident," he said.

This contrasts sharply with the situation in Hongkong, he said, where authorities are only beginning to launch a campaign to educate the public about nuclear energy.

He said that when his Legislative Council colleagues arrive at Three Mile Island next week as part of their own fact-finding tour, they are likely to find that the plant has become a nuclear tourist spot.

"They will get to see videos and have a chance to buy T-shirts, along with the other tourists that come here by the busload," he said.

Like him, they will be taken on a tour of the plant and will be given a small box which detects any change in radiation levels as

well as a pair of earplugs to block out the noise of the large turbines that power the plant.

On safety, he says the authorities cannot guarantee that the plant is fail-safe. "They acknowledge that they have taken all the safety precautions they possibly can, but can't guarantee against another accident."

Tomorrow, Mr Szeto plans to visit the Shoreham Nuclear Power Station near Long Island which was forced to stop operating as a result of massive opposition from local residents.

He returns to Hongkong on August 21 and is undecided about what he will do with his findings.

Meanwhile, the second of two delegations from the Legislative Council leaves today for its highly criticised nuclear fact-finding mission.

Led by Executive Councillor Allen Lee, the delegation includes Mrs Pauline Ng, Dr Chiu Hin-Kwong, Mr Ho Sai-chu and Dr Daniel Tse.

First stop on their itinerary will be Washington, where they are booked to stay at the Watergate Hotel. With single room rates at \$858 per night, it is among the most expensive hotels on the trip, which was initially estimated to cost taxpayers \$200,000.

While in Washington, councillors will meet officials from such Government-sponsored agencies as the Nuclear Regulatory Commission, the Department of Energy and the Federal Emergency Management Agency.

## Briefing in France

Hong Kong SOUTH CHINA MORNING POST in English 7 Aug 86 p 1

[Article by Albert Chan]

[Text]

PARIS: A near disaster similar to the one that was narrowly avoided at the Bugey nuclear plant could happen at Daya Bay unless the Chinese adopt a \$20 million modification plan.

A top official at Electricite de France (EdF) confirmed yesterday that China had not yet made up its mind on whether to accept the recommended equipment modifications.

Mr Pierre Tanguy, inspector general on nuclear safety of EdF, said the Chinese had been informed of the details of the Bugey incident and the necessary modifications required to prevent a similar occurrence.

Such changes had cost 20 million francs (about HK\$20 million) for each nuclear station in France and had been made on all the French plants, he said.

He would not comment on why the Chinese have not decided on the modifications to the Daya Bay nuclear plant.

But another EdF official, Mr M. Caillaud, said there is still ample time for the Chinese to make a decision.

He said the plant in Shenzhen will not be in operation until six years from now.

According to Mr Tanguy, the incident on April 14, 1984, was triggered by a "trivial" incident, a short circuit at the reactor of the Bugey station.

External power which should supply electricity for cooling the nuclear reactor was cut off.

There are two diesel generators which were installed as backup power source, but the first one failed to start. The second one started after 45 minutes.

Mr Tanguy conceded that if both diesel generators failed to operate, it could have led to a similar inci-

dent as at Three Mile Island in the United States.

And he added that it would end with a core meltdown in the reactor, which was the worst possible accident in a nuclear plant.

Following the Bugey incident, a full scale investigation was launched and a report released last year recommended that each nuclear reactor in a plant should be connected to four diesel generators, plus a link with a gas turbine generator.

Mr Tanguy also admitted that there had been human error involved.

At the time of the incident, a yellow light went on at the control room following the short circuit, but the operator did not act immediately.

Red lights had since replaced yellow lights in the control panel so that the operator would take prompt action in the future.

Engineers in France, and those from China involved in the Daya Bay project who will receive training in France, will have to learn how to cope with similar incidents.

Mr Caillaud claimed the Bugey case was an incident - not an accident, as it has been described by the media.

He said an incident is something abnormal that occurred, but is rectified by other backup systems and that final safety had not been endangered.

Accident, he said, referred to cases where the backup safety system failed to operate leading to safety hazards such as the Chernobyl case.

During the briefing, EdF officials also said there had been two cases in France where plans to build nuclear stations had been scrapped due to opposition by locals.

● Leader of the Legco delegation, Miss Maria Tam, said she had asked for the Bugey incident report from French officials.

# IAEA Plans for PRC Visit

Hong Kong SOUTH CHINA MORNING POST in English 9 Aug 86 p 19

[Article by Albert Chan]

[Text]

A TEAM of experts from the International Atomic Energy Agency (IAEA) will inspect the Qinshan nuclear power plant near Shanghai next year and similar inspections will be arranged for the Daya Bay project when construction begins.

Top officials of the agency gave this message to the visiting delegation of the Unofficial Members of the Executive and Legislative Councils yesterday on the last day of their European trip.

The team will consist of about 15 experts, five to six from the IAEA, three to four from nuclear power equipment companies and the rest from member countries of the agency.

"Such an international combination of experts will ensure independence in the study," said Miss Maria Tam, leader of the Umelco group.

The visit to Qinshan station, which will have a 300-megawatt reactor, has been scheduled for next year at the request of the Chinese Government.

Mr C. Herzig, IAEA director of External Relations, told

the Umelco team that with China's increasing involvement in the agency's activities, there is no reason why similar inspections cannot be made on the Daya Bay project.

The Chinese involvement is evident in that one Beijing representative now sits on an agency board dealing with nuclear fuel recycling matters.

China has been a member of the IAEA since October 1983, well before critics of the Daya Bay project expressed fears that China might not be subject to international safety monitoring and may even make use of enriched uranium for military purposes.

But as a member country of the IAEA, China has to abide strictly to the agency's rules, which prohibit the use of nuclear facilities for manufacturing weapons.

Mr Herzig told an unofficial member the IAEA normally sends out its team, called the Operational Safety and Review Team (OSART), on three-week visits to nuclear plants during construction, shortly before operation and during operation.

The team has unlimited access to all installations and equipment in a plant during

visits. After the visit, the team compiles a report advising the country on necessary improvements.

The Umelco team also met Mr M. Rosen, director of nuclear safety at the IAEA. Mr Rosen represented the agency during its investigation of the Three Mile Island accident and is currently involved in the Chernobyl investigation.

He told members that although pressurised water reactors — the design to be used in the Daya Bay station — are of safe design, the human factor plays a vital safety role.

He agreed with a statement by French nuclear experts that evacuation plans are not required for population centres more than 10 km from a nuclear plant. But he added that "an organisation chart" would be desirable.

In the case of an accident, such a chart would clearly define the duties and procedures of fire, medical and health authorities, he said.

IAEA is the last organisation on the visiting itinerary of the Umelco delegation which will leave Austria this morning for Hong Kong.

## Japanese Plant Visited

Hong Kong SOUTH CHIN. MORNING POST in English 12 Aug 86 p 19

[Article by Albert Chan]

[Text]

THE Tokai nuclear power plant, which the Legislative Council fact-finding delegation is due to visit today, has the second-worst incident record in Japan.

With 33 incidents and faults since commercial operation some 20 years ago, the station ranks only after Tsuruga, north of Osaka, which has 39.

In nuclear jargon, an incident is where something abnormal happens, but is rectified by backup systems.

The Tokai station is the nearest to Tokyo, but sources say the large number of incidents was partly because the station was built some 20 years ago when nuclear technology was not very advanced.

According to Japan's legislation on electricity generation and use of nuclear power, electricity companies are required to report in full all incidents to the National Energy Resource agency. Japan now has eight such companies, each supplying power to different parts of the country.

The largest one, Tokyo Electric Power Company, sells power to more than 11 million residents.

The Lepco delegation will visit a nuclear research institute near the Tokai nuclear station and may go to the incident-prone plant.

The figures were collected and the incidents investigated

by the National Energy Resource Agency which is a high-powered body under the Ministry of International Trade and Industry.

The Hongkong delegation yesterday met three directors of the agency who briefed them on the licensing requirements, inspection, training, contingency planning and public education.

Another top official who spoke to the delegates was ambassador Yoshifumi Matsuda at the Ministry of Foreign Affairs in charge of technology. Mr Matsuda told the delegates since China and Japan signed an agreement on nuclear energy co-operation, the two countries have exchanged information on the technology.

He said the first thing the Chinese brought up with the Japanese authorities was safety, because China has no experience in building or managing or operating commercial nuclear reactors.

But what surprised the Unofficials was the meeting with the Nuclear Safety Bureau, where the Japanese experts told the delegation that the authorities had never thought about emergency planning for residents living beyond the 10 km radius of any nuclear plant.

"They appear to be extremely confident about the safety aspects of their plants,"

said Mr Allen Lee, leader of the nine-member delegation.

Mr Lee said this was similar to the arrangement in France, but very different from the United States which has far more detailed plans.

The Japanese officials also said since Japan started its nuclear power program, no incident has involved a release of radioactivity.

But information from the National Energy Resource Agency revealed that last year there were 19 incidents and equipment faults in Japan which has a total of 32 nuclear power stations. All of them led to shut down in plants which meant considerably financial losses.

The main blame was put on management and maintenance.

But the overall figures showed improvement over the last few years.

The Hongkong delegation was also told that about 70 per cent of Japanese people were opposed to nuclear-powered electricity. At present, 27 per cent of the electricity used by the Japanese come from nuclear plants and this will rise to 36 per cent in the next 10 years, delegates were told.

The Chernobyl disaster had not produced any noticeable change in either the public or the Government on the issue, Mr Lee said.

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CSO: 5150/0159

HONG KONG

# DAYA BAY PLANS MAY CHANGE AFTER CHERNOBYL

Hong Kong HONGKONG STANDARD in English 1 Aug 86 p 1

[Article by Sheila Dawes]

[Text]

LONDON: Despite China's avowed intention to go ahead with the Daya Bay nuclear power station some British industrial circles still expect China to announce this autumn that it has abandoned plans to build the controversial Daya Bay nuclear power station.

Their views, first reported in *The Standard* last November, have gained in strength since the Chernobyl accident and in the light of urgent appeals from Hongkong people to site the project further away from them.

A coal-fired system will be constructed in place of the nuclear plant, sources suggested, and they pointed out that all work carried out at Daya Bay so far could usefully be incorporated in the new plans.

One businessman who visits China regularly said "China has a cash problem."

He said: "For some time now a coal-fired system has made a lot of sense. I expect China to say that plans

for a nuclear plant have been halted following anxiety in Hongkong and a wish by China only to build nuclear project after further study has been made of the Chernobyl accident.

"But the main reason for the change will be economic. Coal is much cheaper."

He referred to Chinese communist leaders in Hongkong and claimed they had already let it be known that they would prefer a nuclear station not to be built at Daya Bay.

Britain's GEC, which won a \$250 million order to build the conventional turbine parts of the plant at Guangdong would probably be involved in building the coal-fired system, but Framatome of France who won a contract to build the Pressurised Water Reactors were likely to be unlucky, he suggested.

"I doubt if any new nuclear power stations in China will be built by foreign companies. China will build on her own, as it is doing at Qinshan," he said.

Extensive international discussions about nuclear plant safety design and procedures are being arranged by China to ensure that the future projects are as safe as anything in the West.

Several sources suspected that the Guangdong project had shed some of the safety factors as China made a series of tough demands for price-cutting during the tense final months of negotiations for the contracts.

Not only was the Guangdong design likely to be of a design unlicensable in France, but any current French nuclear PWR would be unlicensable in Britain, sources maintained, since Britain's requirements involved "ultra-safe" factors "even before Chernobyl".

Even usually well-informed sources in Britain and Europe have seen only a "fairly sketchy" design of the project.

/13046

CSO: 5150/0162



HONG KONG

## DEPARTMENT TO MONITOR FOOD RADIATION LEVELS

Hong Kong HONGKONG STANDARD in English 2 Aug 86 p 3

[Text]

THE eating habits of Hongkong residents will be studied as part of the Background Radiation Monitoring Programme which will make it possible to detect differences when the Daya Bay nuclear plant goes into operation.

The study, to be launched next year, will be carried out by the Census and Statistics Department at the invitation of the Royal Observatory and is expected to be completed in two years.

Senior Scientific Officer, Dr M C Wong, who heads the Radiation Monitoring Division of the Royal Observatory, said the study was very important as its findings would affect the accuracy of the whole monitoring process.

"Many foods contain radioactive materials. We do not just eat food, we take in radiation as well. Therefore, we have to calculate the amount of radiation we take everyday and add it to the amount of radiation measured from other areas," Dr Wong said.

"The total amount of radiation will form the

background radiation level in Hongkong," he said. He pointed out that the amount of radiation we take daily is negligible and will do no harm to our bodies.

The study will be based on figures already available at the Census and Statistics Department. These will include import figures for food, the amount of food produced locally, and statistics on family consumption.

Dr Wong said that the system purchased for monitoring background radiation levels would arrive early this month.

He said findings of this \$3 million system would definitely be published.

Results of the meteorological survey around Daya Bay, which is essential to the study of atmospheric dispersion, will be available to the public as well.

Dr Wong said the Royal Observatory has been carrying out meteorological studies in Daya Bay for two years. Analysis of its first year's study will be available in a few months' time, he added.

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CSO: 5150/0161

CANADA

# SASKATOON FIRM TO REPROCESS RADIOACTIVE URANIUM WASTE

Toronto THE GLOBE AND MAIL in English 16 Aug 86 p B5

[Text]

Amok Ltd. of Saskatoon appears to have found a solution to a six-year-old problem — what to do with 2,916 concrete vaults full of radioactive uranium waste.

Bernard Michel, executive vice-president, said the company will spend \$2.8-million, beginning next month, to modify its mill at Cluff Lake in northern Saskatchewan.

The improvements will enable Amok to reprocess the waste, lowering the level of radioactivity, and at the same time to extract gold and uranium.

The plan has been approved by the Atomic Energy Control Board in Ottawa and the Saskatchewan Environment Department.

Mr. Michel said the plan is designed for environmental and worker safety and may result in a \$1-million profit for the company.

About 283,000 grams of gold worth about \$4.5-million at current prices and 56,700 kilograms of uranium oxide worth about \$3.3-million are

expected to be recovered, he said.

The problem began when Amok began to mine uranium ore at Cluff Lake in 1980.

Tim Meadley, the company's safety and environment manager, said no one had dealt with such high grades of ore before and Amok was unsure how best to handle the highly radioactive solid waste that resulted from the milling process.

When deterioration and storage problems resulted in cracks and leakage from a number of the vaults in 1983, Amok stepped up its search for a solution and finally settled on a process that would recover both uranium and gold.

"If something is deteriorating, you don't want to keep it around to keep deteriorating, so the sooner you can get rid of it the better," Mr. Meadley said.

The Cluff Lake mine is owned 80 per cent by Amok, a French consortium, and 20 per cent by the provincial Government through Saskatchewan Mining Development Corp.

/12828  
CSO: 5120/48

CANADA

## ONTARIO DECISION TO COMPLETE DARLINGTON PLANT REPORTED

Toronto THE GLOBE AND MAIL in English 21 Aug 86 p A5

[Article by Robert Sheppard]

[Text]

After a year-long review, the Ontario Government has decided to complete construction of the \$11-billion Darlington nuclear power plant 50 kilometres east of Metropolitan Toronto.

At the same time, to appease critics of the controversial project, the Liberal Government will launch a special study by "internationally recognized experts" of the safety standards of the Candu nuclear system.

To be established this fall after the Legislature reconvenes, the nuclear inquiry will be the third major study of the safety of the Candu system in Ontario in the past eight years, and reflects the post-Chernobyl caution that has imbued the nuclear industry and its Government proponents.

The Liberals, who were opposed to the completion of the project when in opposition, have already said that Darlington will be the last nuclear station built in the province for the foreseeable future.

In giving final approval to the project yesterday, Energy Minister Vincent Kerrio said the deciding factors were the uncertainties of other options and the \$7-billion that had already been committed to the plant.

Nearly \$2-billion of this has been spent in the past year, since the Liberals assumed power and

turned the question of completing Darlington over to a legislative committee to review.

The Cabinet decision to complete Darlington was made two weeks ago at the last meeting attended by Premier David Peterson, who is away on holidays. But the announcement and go-ahead letter to Ontario Hydro chairman Thomas Campbell was not signed until yesterday because Mr. Kerrio was also away, a Government official said.

In approving Darlington and agreeing to set up another study of nuclear safety, the Government is adopting two of the major recommendations of a legislative committee that reported in early July.

At the same time, the Government is putting off, at least for the time being, other recommendations of the committee, particularly that Ontario Hydro be made more accountable to the Legislature and the public.

The special legislative committee on Darlington first reported in December that Ontario Hydro had overestimated by almost three times the peak demand for power at the turn of the century, and may not even require the energy from the four Darlington reactors, to be completed by 1992, until well into the 21st century.

Nuclear reactors are generally planned with a life expectancy of about 40 years, after which they are dismantled and their radioactive parts stored.

In July, the committee recommended completing the \$11-billion plant "because of Darlington's low incremental cost and the uncertainties associated with other short-term options."

The New Democratic Party members of the committee dissented from both reports, arguing that completing only two of the four Darlington reactors would save the province at least \$4-billion and that Ontario is already overly dependent on nuclear power, with at least 40 per cent of its energy coming from this source.

The nuclear industry was quick to applaud the Government's decision yesterday, issuing a detailed press statement that arrived within an hour of Mr. Kerrio's own news release.

New Democrat Ruth Grier said the Liberal decision represents "a mega-mistake" and the province is wrong to put so much emphasis on nuclear development.

HUNGARY

BRIEFS

INDUSTRY MINISTER ON NUCLEAR POWER GENERATION—[Begin Kapolyi recording] These days, with regard to CEMA integration, the utilization of natural resources based on mutual advantages will continue, but expansion will be marked by co-operation such as the joint development of the peaceful utilization of nuclear energy, first and foremost for producing electric energy; by the utilization, with CEMA countries' joint collaboration, of certain natural resources, first and foremost hydrocarbons. In short, a process has evolved that ensures for all of us that everyone should pursue this extremely difficult vocation only at places, to an extent and with the use of technical means, where the work can be valued satisfactorily. [end recording] In harmony with the development of the economy, the Hungarian electrical energy system must be expanded, said the minister. [Excerpt] [From the "Evening Magazine" program] [Budapest Domestic Service in Hungarian 1630 GMT 4 Sep 86 LD] /9274

CSO: 5100/3053

YUGOSLAVIA

## ENERGY EXPERT DISCUSSES NEEDS, NUCLEAR POWER PLANTS

Belgrade PRIVREDNI PREGLED in Serbo-Croatian 18 Jul 86 p 4

[Article by T. Kapetanic: "Dr Hrvoje Pozar Talks About Nuclear Power Plants: Coal Situation Indicates Need for Nuclear Power Plants"]

[Text] Lignite reserves are not inexhaustible. Dynamic economic development implies rapid increase in electric energy generation.

Energy conservation and nuclear power plants are again in the center of attention. In many circles there is insistence on overall analysis of Yugoslav energy potential and needs, and also of conservation and its scope, this being a requirement for basing the need for building nuclear power plants on valid arguments. The federal government is preparing a strategy for development of power engineering. It will be ready for autumn debate in the Yugoslav Assembly.

About a hundred experts have taken part in the discussions concerning construction of four nuclear power plants in Yugoslavia, but they do not include Academician Dr Hrvoje Pozar, a power engineer in Zagreb. He headed a subgroup of the Krajger Commission which developed the strategy for long-term development of Yugoslav power engineering within the framework of the long-term economic stabilization program. The question consequently arises whether the Federal Executive Council is at work on a new strategy for development of power engineering or whether the opinion of the eminent experts who have already completed their complicated task will be followed. In an address delivered recently at the headquarters of the Association of Engineers Technicians of Croatia, Dr Pozar also spoke of nuclear power plants. He called attention to the need for building nuclear power plants, in the light of the anticipated future increase in electric power consumption and the potential for satisfying this consumption need by building conventional coal-fired hydroelectric and thermoelectric plants.

The minimum alternative anticipates an average consumption increase of 4.8 percent per year over the next 35 years, according to Dr Pozar. According to electric power industry estimates, this increase will be nearly 5 percent (4.99 percent). Yugoslav consumption in 1985 was as high as 6.4 percent. It should be pointed out that the consumption per inhabitant in Yugoslavia is among the lowest in Europe. Consumption lower than that in Yugoslavia is found only in Greece and Portugal.



"Irrational energy consumption has been discussed with increasing frequency of late. I am fundamentally in agreement with the finding that consumption is irrational. My analyses nevertheless show that the consumption of forms of energy other than electricity is much more irrational. Heat is the least rationally consumed, and is also the area of heaviest consumption. Consumers utilize around two-thirds of the total amount of energy in this form.

"According to the minimum estimate, 5,751 billion kilowatt-hours will be needed from 1984 to 2020, and 7,174 billion according to the maximum estimate. To the end of this century, the thermoelectric power plants already built and the Krsko nuclear power plant will generate 767 billion kilowatt-hours, including 610 billion in coal-fired thermoelectric power plants, while hydroelectric plants, including pumped storage hydroelectric plants, will generate 1,740 billion, assuming that all the economically justified water power resources are developed. The entire potential already completed can satisfy 43.5 percent of the requirement if the minimum estimate is adopted, and 35 percent if the maximum is adopted. The remainder must be generated in coal-fired thermoelectric plants and nuclear power plants.

"In the light of the current level of development, in the immediate future only nuclear power plants with thermal (slow) reactors can be considered, along with hydroelectric and conventional thermoelectric plants, and in 10 to 15 years probably fast reactors as well. Can we wait until more reliable and economical energy sources are found? In the next 10 to 15 years, of the promising energy sources only fast reactors, the so-called breeder reactors, will be commercially ready. The specific fuel costs in such reactors will probably be lower than in the current thermal reactors, but the specific investment per unit power will certainly be higher because of the more complicated design. The introduction of breeder reactors into the system will be possible really only after the thermal reactors, in which the plutonium needed for breeding, have been in operation long enough. The period of development of such reactors to commercial readiness is a very long one. Up to the present it has not been possible to perform energy-active nuclear fusion even under laboratory conditions.

"The most recent estimates of coal reserves in Kosovo, not officially confirmed, indicate increased lignite reserves. Generation in thermoelectric plants can be increased by 2.023 billion kilowatt-hours, and the needs of thermoelectric plants built up to 2020 based on the minimum estimate can be satisfied with this amount, but only 86.7 percent of the needs based on the higher estimate. Consequently, the needs cannot be met even with the larger reserves. Regardless of whether smaller or larger reserves of coal are involved, all calculations show that we will have no coal by the year 2020."

6115/12955

CSO: 2800/320

ARGENTINA

ALFONSIN ON NUCLEAR ARMS RACE

PY252137 Buenos Aires TELAM in Spanish 1201 GMT 25 Aug 86

[Text] Buenos Aires, 25 Aug (TELAM) -- Argentine President Raul Alfonsin has stated that the most imperative task of all states is to prevent the outbreak of a nuclear war and the only way to save the world from this threat is to eliminate nuclear weapons.

This was Alfonsin's answer to Yuriy Rublevskiy and Isidoro Gilbert, correspondents of the Soviet news agency TASS, who interviewed Alfonsin at the request of the Moscow daily PRAVDA to discern his opinion concerning the eradication of atomic arsenals in general and the 18 August decision by the Soviet Government to extend the moratorium on all nuclear tests until the end of the year in particular.

Alfonsin said: In our joint declaration of 22 May 1984 and in the New Delhi Declaration of 28 January 1985, we (the heads of government of the "Group of Six") stated that the tests, production, and deployment of nuclear weapons and their carriers must cease and a substantial reduction of nuclear forces must follow immediately.

This is the course of action that we propose to use to put an end to the nuclear arms race and to achieve nuclear disarmament, he added.

He continued: In this regard we have been notified of the Soviet Government's decision to extend the moratorium on nuclear tests, and we must express our satisfaction over this measure.

Alfonsin concluded by saying that to take this measure a step further we recently proposed in Mexico the establishment of a suitable verification mechanism, and offered to General Secretary Gorbachev and President Reagan to arrange a meeting of experts from our countries (of the Group of Six) with Soviet and U.S. experts.

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CSO: 5100/2118

BRAZIL

NUCLEAR INSPECTION CLAUSE WITH ARGENTINA REJECTED

PY201448 Madrid EFE in Spanish 1517 GMT 19 Aug 86

[Text] Buenos Aires, 19 Aug (EFE) -- Brazil has rejected a clause of mutual inspection with Argentina in the area of nuclear energy. The clause was to be included in the integration agreement between the two countries, signed by Presidents Jose Sarney and Raul Alfonsin two weeks ago.

The daily TIEMPO ARGENTINO today published exclusive remarks by Jose Goldemberg, rector of the University of Sao Paulo, who said that it is not in Brazil's interest to accept such inspections, even though it does not intend to produce nuclear arms.

On the other hand, sources from the Argentine nuclear sector today said that they are "in direct communication with the people in Brazil" about the facilities in Serra do Cachimbo which, according to the Brazilian press, are capable of testing nuclear arms.

The Argentine position favors signing an agreement of mutual inspection to prevent either of the two countries from using nuclear energy for military purposes, but without the obligation to disclose industrial secrets. Argentina possesses an advanced nuclear industrial technology. The country's products range from natural uranium to the heavy water needed to cool its three nuclear reactors now in operation. Argentina also manufactures Zircaloy tubes, needed to place the enriched uranium inside the reactor.

/9738

CSO: 5100/2114

BRAZIL

ARMED FORCES OFFICIALS 'UNAWARE' OF NUCLEAR TALKS

Amaral Oliveira Comments

PY231906 Sao Paulo FOLHA DE SAO PAULO in Portuguese 21 Aug 86 p 9

[Excerpt] Rio de Janeiro -- Armed Forces General Staff (EMFA) Chief Jose Maria do Amaral Oliveira, 60, said yesterday that he is unaware of the existence of studies for an agreement of mutual inspection of nuclear facilities between Brazil and Argentina as Itamaraty Secretary General Paulo Tarso Flecha de Lima told FOLHA DE SAO PAULO on 18 August. Amaral Oliveira reasserted that the facilities at the Cachimbo test site are exclusively designed for testing conventional weapons and denied that Brazil is interested in building an atomic bomb. He said: "Brazil is an earnest country. We have signed the Tlatelolco treaty (by which the signatories commit themselves to use nuclear energy just for peaceful purposes) and we will fulfill it." [passage omitted]

Saboia Comments

PY232108 Sao Paulo FOLHA DE SAO PAULO in Portuguese 22 Aug 86 p 4

[Text] Rio de Janeiro -- Navy Minister Henrique Saboia, 60, said yesterday in Rio de Janeiro that he is unaware of the drafting of an agreement of mutual inspection of nuclear facilities between Brazil and Argentina. He said: "If such an agreement is being discussed, then Itamaraty is the agency concerned. The ministers of state just fulfill the resolutions of the diplomatic agreements." According to the Navy minister, there is great cooperation between the Brazilian and Argentine navies. However, he also said that he is unaware of the possibility of a technological agreement between the two countries to build submarines.

Saboia came to Rio de Janeiro to preside over the ceremony to accept the training ship "Brasil" for the Navy fleet at the Ilha das Cobras shipyard (at Guanabara Bay), where the ship was built. According to cost estimates made by Henrique Saboia, 83 percent of the ships equipment was manufactured in Brazil. The vessel cost nearly \$100 million.

The Brazilian Navy hopes to complete in 1991 a program to expand its fleet at a total cost of \$1.5 billion. A total of \$450 million will be spent to build three submarines.

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CSO: 5100/2115

BRAZIL

FRG MINISTER COMMENTS ON NUCLEAR AGREEMENT

PY201730 Rio de Janeiro O GLOBO in Portuguese 19 Aug 86 p 18

[Text] The FRG Government does not intend to renegotiate with the Brazilian Government the basic Nuclear Agreement signed between the two countries in 1975 in view of Brazil's decision to reduce its rate of development by postponing several projects. It will complete only the Angra II and Angra III nuclear power plants.

This intention will be restated today by FRG Research and Technology Minister Heinz Riesenhuber during a meeting with President Jose Sarney and Science and Technology Minister Renato Archer. Riesenhuber yesterday explained in Rio de Janeiro that he also does not believe that Brazil is interested in renegotiating the agreement between the governments since the necessary adjustments will be made only by the enterprises involved (KWU and Nuclebras).

The main goal of the FRG minister's visit to Brazil is to hold discussions with Brazilian authorities in order to identify projects aimed at expanding technological cooperation. As an example, he cited the health, environmental, biotechnology, and electronic research fields.

Riesenhuber denied reports that the FRG will not enter into an agreement with Brazil similar to the one signed in 1975. He made it clear that there has been a misinterpretation and that the fact that a decision has now been made to build only two reactors and not eight does not change in the least the broad cooperation agreement between Brazil and the FRG.

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CSO: 5100/2114



BRAZIL

IAEA OFFICIAL TERMS ANGRA DETECTION SYSTEM SAFE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 12 Aug 86 p 24

/Text/ Rio de Janeiro--Enzo Iansiti, scientific secretary of the international advisory group on nuclear safety, subordinate to the International Atomic Energy Agency (IAEA), said yesterday that "the Angra I nuclear power plant has one of the most advanced failure detection systems in the world, in both equipment and personnel." The specialist in the safety of atomic energy plants, who attended the International Conference on the Safety of Reactors and Pressurized Water yesterday afternoon at the Petrobras auditorium in Rio, said that, before coming to Brazil, he studied IAEA's emergency planning provisions relevant to the conditions of the Brazilian power plant.

Camilo Penna, president of Furnas, who also attended the international conference, said in turn that the Angra I nuclear power plant can be put back into operation within 20 to 30 days. He said that within 10 days the Federal Court of Appeals (TFR) will determine whether the power plant's case can be tried within the jurisdiction of the state court or the federal court.

He then referred to the appeal made to the Justice Department, supported by the community of the Rio municipality of Angra dos Reis, site of the first Brazilian nuclear power plant. He said in this regard that the reason for the appeal--the lack of an emergency plan of common knowledge to the people--will likely be taken care of in the near future. The former minister of industry and commerce also said that he is now awaiting disclosure of the emergency plan by the federal government's Civil Defense Department, subordinate to the Ministry of Interior.

In speaking of the Angra I emergency plan, Enzo Iansiti stated emphatically that the most important point is to have a plan which is workable and trustworthy; he made no further remarks about the Brazilian power plant saying that it was not up to the IAEA inspector to evaluate the true conditions of the country's first atomic energy plant for the production of power. Iansiti stressed that the Angra I plant's safety detection system "is the best among those of all developing countries in equipment, personnel, training and computerization."

Chernobyl Lesson

The IAEA secretary said that there were acts of heroism during the Chernobyl accident in Kiev in the Soviet Union and that "many individuals sacrificed their lives trying to make the plant a safe place in which to work."

In speaking about the lesson learned from the Chernobyl accident, Iansiti said that "the most important thing which occurred in connection with the Kiev accident was the verification that much can be done to obviate the release of radioactivity into the water and atmosphere." He said that on 25 August the IAEA is going to begin a 5-day seminar in Vienna "at which the Russians will give a detailed account of what really happened at Chernobyl."

#### Accidents

Jose Golbenberg, rector of Sao Paulo University, will take part in the International Conference on Nuclear Energy today. In his speech he will deal principally with the subject of the safety of hydroelectric and nuclear power plants and will assert that "the Chernobyl accident showed that the risks accompanying nuclear accidents affect much greater areas than those affected by possible accidents in hydroelectric plants which, by their very nature, result in much less extensive damage."

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CSO: 5100/2111

BRAZIL

NAVY CARRIES OUT OWN NUCLEAR RESEARCH PROGRAM

PY270316 Sao Paulo FOLHA DE SAO PAULO in Portuguese 23 Aug 86 p 4

[Text] The Brazilian Armed Forces are carrying out a nuclear research program which parallels the government program, based on a 1975 agreement with the FRG. By 1994, the Brazilian Navy expects to test the prototype of a small nuclear reactor called "critical reactor" [reator critico], which will serve as a model for a "compact reactor" that will be the propelling unit of the first Brazilian nuclear submarine. This submarine is expected to be built by the second half of the 1990's.

Part of the machinery to build and operate this test reactor is being designed in the Nuclear Engineering Institute [IEN], linked to the National Commission for Nuclear Energy [NEN], and located on the campus of the Rio de Janeiro Federal University [UFR] on Fundao Island, north of Rio de Janeiro. The IEN is cooperating with the so-called "instrumentation stage" of the project. The hull of the first Brazilian nuclear submarine is being studied by the Navy and the Nuclebras heavy equipment corporation, [NUCLEP], a Nuclebras subsidiary in charge of the design and building of the heavy components of the Brazilian nuclear reactors.

The Brazilian Aeronautics Ministry is also studying the possibility of building a more sophisticated reactor known as a "fast breeder" [in English] or a "regenerator reactor" [reator regenerador], which continues working after consuming its initial fuel. The Aeronautics Ministry projects are being developed at the Advanced Studies Institute [IEAV] of the Aerospace Technology Center [CTA] in Sao Jose dos Campos [97 km northwest of Sao Paulo]. The Navy projects are being developed at the Institute for Nuclear and Energy Research [IPEN], also linked to the CNEN, and at the IEN.

Both the Navy and Aeronautics Ministers are carrying out research to enrich uranium—that is, to separate uranium isotopes, U-235 and U-238, (number of protons and neutrons of the atomic nucleus) to produce plutonium—which is a necessary element for nuclear fission. The Navy and the Aeronautics Ministers concentrated on the uranium-enrichment process through the use of laser beams, which "excite" and modify the original structure of natural uranium. A nuclear engineer, who served on the commission created by President Sarney to re-evaluate the Brazilian nuclear program, became familiar with the uranium-enrichment research carried out at the IEAV by the Brazilian Air Force [FAB].

FOLHA DE SAO PAULO also learned that the FAB is working on plans for a linear accelerator of particles [acelerador linear de particulas] to establish measures for nuclear parameters. For at least 5 years, all this research has been headed by Brigadier General Hugo de Oliveira Piva, former IEAV director. Meanwhile, the nuclear research of the Army Technological Center [CETEX], is considerably behind schedule.

The test reactor developed by the Navy is the result of 4 years of research which began after a team from the Navy Research Center (formerly the Navy Research Institute, which works on Governador Island in Rio De Janeiro) went to work at the Nuclear Research Institute. The project has already been approved by the CNEN, and the security of all the works to develop the propelling system of the first Brazilian nuclear submarine is being supervised by the Naval Intelligence Center [Cenimar], headquartered in Brasilia.

The reactor -- which is actually a prototype -- must be tested on land in 8 years. It will serve as a model for the so-called "compact reactor," the size of which will depend on the size of the nuclear submarine. Initial calculations estimate that the submarine will be 70 meters long and will displace 2,500 tons of water at surface and 2,700 tons underwater. It will be a small-sized nuclear submarine, comparable to the smallest in its category built in France.

It is thought that the "compact reactor" will be aided by diesel motors or gas turbines, like the system used by the same sort of vessels in the French and Soviet Navies. The so-called conventional motors give the nuclear submarine's crew a greater degree of safety, mainly during submersion and if there is a problem with the reactor.

The Navy intends to design its nuclear submarine based on the building experience of a conventional German submarine: the IKL-209-1400. The first of these ships is being built in the FRG, and its construction is being followed by a group of Brazilian Naval engineers. Three other units will be produced in the Rio de Janeiro Navy shipyard.

FOLHA DE SAO PAULO found out the Brazilian Navy is not satisfied with the German IKL construction because it is not respecting the construction technology of the IKL-209-1400, to the extent expected by the former government Naval authorities, who signed the contract with the Germans. This observation was raised to the FRG Defense Minister Manfred Wörner, (an airplane pilot) who visited Rio de Janeiro, Brasilia, and Sao Paulo about 3 months ago, but no positive results were obtained. Wörner maintained that his government could not intervene in a contract between Brazil and a private German company.

The IKL-209-1400 was chosen after the Navy examined with great interest the Italian submarine "Nazario Sauro," which is heavier than the German model. Besides, the Italians refused to transfer their vessel's building technology to the extent the Brazilians desired.

The Brazilian nuclear submarine will carry completely conventional and reduced weaponry: only six torpedo tubes (instead of the usual eight on a conventional submarine). Its speed will reach between 25 and 30 knots, according to the same initial calculations.

The building of a nuclear submarine will lead Brazil to other types of research. For example, the type of steel to be used in the IKL-209-1400 will be HY-80 steel (a special type of steel for the hull designed to resist great pressure underwater). Certainly, Brazil will be ready to begin construction on a nuclear submarine by the end of the next decade.

The nuclear researchers of the Brazilian Armed Forces together with the scientific institutions constitute a nuclear program parallel to the one defined 11 years ago when Brazil and the FRG signed the so-called nuclear agreement. A FAB colonel who works in this field and who was consulted by FOLHA DE SAO PAULO, preferred to call the program the "national nuclear program."

The commission created last September by President Sarney to re-evaluate the Brazilian nuclear program, did not bother to investigate whether or not the Armed Forces could be researching nuclear technology to apply to its war machines. What is more, the Brazilian Society of Physics does not believe the Navy nor Aeronautics ministries may already possess qualified teams of experts to design sophisticated reactors, such as the "fast breeder" type.

FOLHA DE SAO PAULO also found out that CTA experts are researching on the use of thorium, which is a mineral found widely in Brazil and India, as fuel for a future nuclear reactor.

/6091

CSO: 5100/2119



BRAZIL

PLANT CONSTRUCTION LIMITATION TO THREE DEEMED SUFFICIENT

Nuclear Plants Considered Nonessential

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 8 Aug 86 p 3

/Text/ The president of the republic has just approved a new schedule of projects to be included in the Brazilian nuclear program calling for the installation of the Angra II and Angra III power plants by 1992 and 1995 respectively together with carrying out the agreement signed with the FRG. Nothing more is to be included in that program which initially called for the construction of eight nuclear power plants at an expenditure of \$25 billion to \$30 billion.

Jose Sarney was correct in his decision; not that we would be carrying out such a burdensome program but simply because the materiel for the two plants now to be installed as supplements to the Angra I to complete the Angra dos Reis nuclear park has already been purchased and, for the most part, delivered to Rio de Janeiro. The equipment is stored at the atomic reactor factory in Itaguaí (yes, General Ernesto Geisel also bought a secondhand factory from the Germans). Therefore, there is nothing more logical than to install this equipment for whose import we are paying a high rate of interest, amounting to approximately \$4 billion. As Camilo Penna, president of Furnas, remarked a short time ago, our country is not wealthy enough to extract dollars from the sea.

It is well to recall that, in addition to the two German nuclear power plants, we have an initial plant imported from the United States ready to start up after the completion of certain tests and momentarily shut down for normal periodic maintenance. Moreover, the American plant is now under a restraining order instigated by the people of Angra subsequent to the Chernobyl accident in the USSR. It is this plant and not those which we shall be building with German financing which will be helping the southern and southeastern areas in face of the serious threat of severe rationing of electric power foreseen before the end of this year. Therefore, we cannot confuse the emergency projects, such as the activation of the oil and coal thermal plants and the nuclear energy plants, with the two new undertakings heretofore held in abeyance and now given the green light by the president. The program consists of two stages, one over the short term and the other over the intermediate term. In fact, the nuclear plants scheduled to start up in 1992 and 1995 are allegedly nonessential inasmuch as we could unquestionably supplement the thermal energy systems with oil-fired plants, oil being a commodity which we have available in increasing quantities, or coal of

which we have a surplus and no market, not to consider the possible use of gas from Campos where new reserves are being discovered almost on a daily basis. However, since Gen Geisel has launched us on this adventurous program, leaving it to his successors to bear the heavy burden of faits accomplis--physically accomplished, since German industries have produced and rapidly sent us the equipment under consideration--there is nothing else to do than to take every possible advantage of the situation and reduce the costs as much as possible while observing the strictest safety precautions. We cannot let ourselves be dominated by the Chernobyl syndrome as we have frequently asserted.

However, we have reason to question the fulfillment of the nuclear accord signed in 1975 with the FRG, or at least to insist on a careful review of that accord. This is the case unless the Brazilian Government has already informed the FRG that it does not intend to carry out that accord insofar as the purchase of new nuclear plants is concerned, as initially planned. We should install only those plants which, unfortunately, we cannot ship back to Germany, since they undeniably belong to us. We are paying a high price for them. The equipment is here; what can we do? But there should be no question of purchasing additional dangerous and dispensable nuclear power plants in a country which possesses immense hydraulic potential in addition to oil, coal and gas.

Therefore, we are convinced that the president acted wisely. Nevertheless, he should reassert, as he did 8 months ago, that three expensive, dangerous and technically dispensable nuclear power plants are sufficient for Brazil in this century. Even too much.

#### MME Official's Comment

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 12 Aug 86 p 24

/Text/ Brasilia--Paulo Richer, secretary general of the Ministry of Mines and Energy, said yesterday that the decision made by President Jose Sarney to complete the Angra II and Angra III nuclear power plants by 1992 and 1995 respectively was very wise inasmuch as the \$2.25 billion to be invested for the production of about 2,600 MW represents the most opportune expenditure which could be made to produce that quantity of power for the southeastern area.

According to Richer, no hydroelectric power plant built in the southeastern area by 1992 and 1995 could produce as much power as that which will be produced in Angra dos Reis at such a low cost and in such a short time. \$1.05 billion will be invested in Angra II and \$1.2 billion in Angra III. The MME secretary general's reasoning does not take into consideration what has already been spent for the two power plants (\$1.4 billion since 1976: \$1.07 billion for Angra II and \$330 million for Angra III) or the finance costs, estimated at \$2 billion for the current schedule of events (1992 and 1995). The finance costs may be even greater if the projects fall behind schedule.

The two nuclear plants are near Rio de Janeiro; this will result in a saving in transmission lines. The plants will operate 24 hours per day at 90 percent of their normal capacity--the average of German reactors of the same type.

8568  
CSO: 5100/2111

BRAZIL

BRIEFS

PIRES ON NUCLEAR CYCLE MASTERY--Brasilia--Army Minister General Leonidas Pires Goncalves said yesterday that, besides being a right, it is an obligation for Brazil to master the entire nuclear cycle due to the benefits which this can bring to the country and its people. "Any country which enters the 3d millenium without having mastered the nuclear cycle will not be a world power," said the minister in whose opinion the advantages of energy originating from nuclear fusion are "unforeseeable" and "immeasurable." He then went on to say that, in the case of nuclear fusion, there is not even the risk of having to live amid nuclear waste. The minister ended his interview with the comment that Brazil does not have the necessary funds or technology to carry out nuclear projects for nonpeaceful purposes. /Text/ /Sao Paulo O ESTADO DE SAO PAULO in Portuguese 13 Aug 86 p 2/ 8568

NUCLEP, NUCLEI ELIMINATION RECOMMENDATION--Rio de Janeiro--Licinio Seabra, president of NUCLEP, said yesterday in Rio that this state firm is now 60 percent idle and that he therefore agreed with the recommendation made by the committee appointed to re-evaluate Brazil's nuclear program and chaired by physicist Israel Vargas that this firm be eliminated together with the other Nuclebras auxiliary, NUCLEI. According to Licinio Seabra, the elimination of NUCLEP and NUCLEI will be reviewed by the Ministry of Mines and Energy which will determine the fate of the two state firms in accordance with the initial objectives of the nuclear program which included the construction of eight power plants. The NUCLEP president recalled that the committee responsible for re-evaluating the country's objectives in the nuclear sector recommended the construction of only two power plants, the Angra II and the Angra III; this was to justify the investments already made in the Angra dos Reis plant, including civilian projects. On the 2d day of the International Conference on the Safety of Nuclear Reactors, attended by the NUCLEP president and Israel Vargas, adviser to the Ministry of Mines and Energy, Rex Nazareth Alves, president of the National Commission for Nuclear Energy (CNEN), gave his assurance that the Angra I power plant has all the safety features necessary. Professor Joaquim de Carvalho, associated with the Sao Paulo Power Company, criticized the conference, sponsored by the Brazilian Academy of Sciences, saying that "there was general discussion of certain aspects of the risks inherent in the operation of nuclear power plants and their impact on the environment but that, even here, the discussion was limited." In his opinion, it would be interesting to extend the discussion to the "impact on social and human ecology." /Text/ /Sao Paulo O ESTADO DE SAO PAULO in Portuguese 13 Aug 86 p 24/ 8568

NAVY MINISTER ON ATOMIC BOMB--Navy Minister Henrique Saboya reasserted today in Rio de Janeiro that there is no definite plan for the production of enriched uranium to be used as fuel for the propulsion of submarines built in Brazil. The minister stated that studies on nuclear energy being developed by the Navy with the cooperation of scientists at the University of Sao Paulo are aimed at a future project. He added that the fact that a nuclear-propelled submarine is to be built does not mean that Brazil already has the technology to build an atomic bomb. [Text] [Brasilia Domestic Service in Portuguese 2200 GMT 4 Sep 86 PY] /6091

FORMER NAVY MINISTER ADVOCATES ATOMIC BOMB--Rio de Janeiro, 5 Sep (AFO)--In a statement released here today, former Brazilian Navy Minister Admiral Maximiano Fonseca advocated the manufacture of an atomic bomb in Brazil. If it was up to me to decide, I would make an atomic bomb and detonate it in front of international observers to demonstrate the extent of national technical know-how, the admiral said. Maximiano Fonseca, navy minister under General Joao Baptista Figueiredo, last of the military rulers, launched research on nuclear propulsion in Brazil. The existence of this research was confirmed yesterday evening by the current navy minister, Admiral Henrique Saboya, who admitted that Brazil wants to develop its own technology to build nuclear submarines. In his plea for a Brazilian atomic bomb, Fonseca stated that one hates to see the big powers developing and detonating atomic, cobalt and neutron bombs without being able to do the same ourselves. [Text] [Paris AFP in Spanish 2136 GMT 5 Sep 86 PY] /9274

CSO: 5100/2123

INDIA

CORRESPONDENT INTERVIEWS AEC CHAIRMAN RAMANNA

Calcutta THE STATESMAN in English 7 Aug 86 p 9

[Interview with the Chairman of the Atomic Energy Commission, Dr Raja Ramanna by V. S. Maniam; date and place not given]

[Text]

NEW DELHI, Aug. 6.—According to the chairman of the Atomic Energy Commission, Dr Raja Ramanna, nuclear power remains "probably the safest, cleanest and cheapest" source of electrical energy "despite the recent incident at Chernobyl".

Dr Ramanna, who was replying to a series of questions by The Statesman on the AEC's work, said the hazards to mankind from nuclear technology arose not from civilian nuclear power stations but from the nuclear weapons programme of the nuclear weapons nations.

On cost, he repeated that nuclear power was already economically viable: "The present cost of electricity from our nuclear stations ranges from 35 paise to 50 paise a unit, which compares very favourably with the cost of electricity from thermal power stations".

What is more important is that the country's nuclear power stations are now earning significant revenues. "It is no exaggeration to state that investments in atomic energy have yielded handsome dividends to the country".

Dr Ramanna noted that several factors had impeded the progress of India's nuclear power generation, not the least of which was what he described as the post-1974 international situation and the "restriction imposed by foreign countries on export of critical equipment to India". Nineteen seventy-four was the year of the peaceful nuclear explosion at Pokhran in Rajasthan.

Dr Ramanna rounded off his answers with the firm assertion that, with dwindling natural resources of coal, oil and gas, "nuclear power — be it from present-day reactors

and breeders or from fusion—will be the only answer for meeting mankind's energy needs in the decades to come".

The following are the questions put to the AEC Chairman—questions which he felt were "provocative"—and his answers:

**SELF-RELIANCE**

**Q:** For quite some years past, it has been stated that India is self-reliant in the entire nuclear fuel cycle and that very considerable expertise has been built up in this field. So far, however, that does not seem to have led to any substantial nuclear power generation. Why?

**A:** To say that we are today completely self-reliant in the entire nuclear fuel cycle is no exaggeration. This fact was established when the first unit of the Madras atomic power station was commissioned about three years ago where 90% of the components were of Indian origin. The primary reason why this has not led to substantial nuclear power generation has to do with the nature of nuclear technology itself—it involves highly complex technology, needs heavy financial investments in the initial stages, and, above all, it has so far been a monopoly of a few developed countries who control the availability of components spare parts etc. It was inevitable that our initial steps would be slow. The post-1974 international situation also contributed significantly to the slow progress. In addition, the nuclear power projects, themselves, need relatively longer construction schedules. But with the commissioning of the MAPS units, we acquired the confidence to step up the nuclear power programme on a modest scale with the objec-

tive of increasing the contribution of nuclear power to the country's total electrical needs, from the present estimate of 2% to 3% to at least 10% by the turn of the century. In quantitative terms, there has been a steady growth in electricity generated by nuclear power stations during the past few years: from 3.5 billion units in 1983-84 to about 5 billion units in 1985-86—a 50% increase in just two years.

**LONG DELAYS**

**Q:** Several of our projects whether power stations or heavy water plants, have been beset with long delays, resulting in considerable escalation of costs. What are the causes of such delays? Are we overcoming them? With what success?

**A:** It is a fact that completion of many of our earlier projects was significantly delayed in the past. In retrospect, one can also add that some of these delays could have been avoided. But the basic reason was that both the Central Department of Atomic Energy and the indigenous industry were in the learning stages of developing and assimilating this advanced technology — evolving designs, manufacturing methods, construction and commissioning procedures. This was compounded during the post-1974 years by the restriction imposed by foreign countries on export of some critical equipment to India. In addition, some of the delays were also due to the indigenous manufacturers not adhering to committed delivery schedules and, sometimes, quality. All these factors did lead to some unavoidable delays and escalation in project costs.

This experience has taught us



to take corrective steps in respect of future projects and these steps have shown results. The nuclear power project at Kakrapar is progressing on schedule and the heavy water projects at Thal-Vaishet and Manuguru are expected to meet their deadlines. If not improve on them.

**Q:** Some academics charge that the massive investments in atomic energy have not yielded commensurate, even reasonable, returns. Is that correct?

**A:** I would say that such statements do the academics no credit. Investments made in atomic energy over the years can be categorized into those made in public sector units, research and development and nuclear power. As for the public sector units, their performance has been satisfactory. Their annual balance-sheets and profit-and-loss statements speak for themselves.

But how does one measure "commensurate or reasonable returns" from investments made in research and development in the field of atomic energy or, for that matter, in any other R&D field. The returns generally intangible by way of technology transfers or due to spin-offs into other fields due to advances in any one technology.

#### BARC GROUP

BARC has a technology transfer group which transfers proven technologies in different fields to other organizations for commercial use. A detailed analysis of this will surely show that the returns from investment in R&D have been much more than "commensurate or reasonable."

Coming to the nuclear power sector, the nuclear power stations are now earning significant revenues. During 1985-86, the sale of electricity from the six nuclear power reactors (at Tarapur, Kota and Rajasthan) is estimated to have earned Rs 169 crores. This brings the total lifetime earnings to-date from these stations to more than Rs 734 crores, with an estimated Rs 170 to Rs 200 crores being added every year in the coming years. One can compare these figures with the final total project costs of these six power reactors which is about Rs 503 crores.

In addition, when one talks of returns, the conservation of such natural resources as coal or oil, which otherwise, would have to be consumed to generate electricity, is also an important aspect. For example, nuclear power has so far generated about 45 billion units of electricity which, if generated by thermal power stations, would have consumed more than 22 million tons of coal and 500 million litres of furnace oil.

#### UNSAFE

**Q:** The fear that nuclear power is unsafe at any cost is voiced

strongly. The highly publicized Chernobyl disaster is bound to fuel such fears. Is that fear justified? There is also a view that it would be absurd and uneconomical to look for a guaranteed 100% safety in the area of nuclear power generation, or any other hi-tech area.

**A:** Given the lack of credible sources of periodic and reliable information on the subject of nuclear power, radiation, etc, the general apprehension about this field is understandable. No doubt a small portion of the highly publicized, shrill and illogical fears are deliberately biased if not motivated and are, in themselves the cause of such apprehensions. One says this because of the unfair application of different standards for evaluating human safety. Should not safety of human life be a prime factor, whichever type of incident is involved? Despite the fact that a large number of casualties have resulted in recent times from catastrophic incidents in aviation, in the chemical industry, in mining, in rail transport, in the collapse of dams etc., no one has taken up a crusade of safety in these areas, let alone calling for a halt to flying of aircraft, shutting down chemical plants, stopping travel by rail, halting of mining work or construction of hydel projects. But a Chernobyl is sufficient to cause worldwide questioning about the safety of nuclear power. Why the double standards?

Let us look at facts. Until the Chernobyl incident, nuclear power stations could have claimed the unique distinction of not having had a single fatal nuclear-related accident during the course of almost 4,000 reactor years of experience. Nuclear technologists are fully aware of the hazards of radiation and it is, for this reason, the overriding parameter of safety combined with a design philosophy of "if such an event occurs, how to ensure safety", always form the design basis of nuclear reactors all over the world. Despite the recent incident at Chernobyl, one would iterate that nuclear power probably is the safest, cleanest and cheapest—in that order—source of electrical energy.

In nuclear technology, designers just do not stop with one safety feature. They assume all possible scenarios, and provide for backup systems even for the safety systems with what generally is known as fail-safe systems. Practically no other field, maybe with the exception of space and aviation, takes safety so seriously and even in these fields we are aware of what has happened in recent times. It is against the background of such design philosophy, safety norms, manufacturing methods, strict documented procedures for quality control, testing etc, that one says with conviction that nuclear power is safe.

**Q:** In sharp contrast to critics of the AEC, many are asking whether India is sufficiently developed in the nuclear field to cope with potential nuclear threats from you—know—where? Are we sufficiently well developed to counter such threats? What is your own perception of such a threat?

**A:** Taking the second question first, one would say that the perception of a nuclear threat to India obviously depends on many external factors. For example, the international situation regarding the arms race, progress in nuclear disarmament, the existence of nuclear weaponry—in all its forms, irrespective of the country—close to our borders, and so on. An analysis of this also involves a political assessment. But speaking for ourselves, everyone is aware that India's nuclear programme is, at present, oriented towards the peaceful uses of atomic energy.

To begin with, this means nuclear power generation to meet the country's growing needs of electrical energy. In support of this objective, we are also carrying out several R & D activities in related fields so that the country is completely indigenous in all aspects of nuclear technology. The Prime Minister has made remarks in Parliament and elsewhere which are pertinent to your question and I do not have to elaborate on them.

**Q:** To return to power generation, the AEC projection of 10,000 MW of nuclear power by the year 2,000 is considered by some as not really adequate against the background of the growing demand for power. Cannot the nuclear sector, possibly, contribute more?

**A:** I would very much like that nuclear sector contributes more than the proposed target of 10,000 MW by the turn of the century for the simple reason that the country's demand for electricity during that period is going to be at least three times what it is now. However, our plans have been made on certain realistic assumptions about the availability of finances and manpower. Depending on the progress achieved by the 1990s, the department would naturally conduct a mid-term review to see whether nuclear power can make a higher contribution in the subsequent decades. The success of our long-term programme will, no doubt, depend on a firm commitment about availability of finances for this programme and the indigenous industry being assured of continuing orders for critical equipment so that promised delivery and project schedules are maintained. This, I think, will be the crucial factor affecting the success of our long-term nuclear power programme.

/13104

CSO: 5150/0153

INDIA

## PEACE MARCHES CALL FOR END TO NUCLEAR ARMS

New Delhi PATRIOT in English 7 Aug 86 p 3

[Text] A number of peace marches and meetings were held in the Capital on Wednesday to mark the 41st anniversary of the first nuclear holocaust in Hiroshima, Japan.

Some 2,000 National Service Scheme volunteers from the various colleges of Delhi University took part in a peace march against nuclear weapons on the occasion. Their procession, which started from India Gate, ended at the UNDP office in Lodi Estate where they presented a memorandum against "the mindless race for annihilating the human race".

Chief Executive Councillor Jag Parvesh Chandra and the deputy chairperson of the Metropolitan Council were present on the occasion.

The Delhi Chapter of Bertrand Russell Study Forum led another peace march from the UPSC hall to the UN office in Lodi Estate. The marchers, including students from Springdales, Frank Anthony and Blue Bells Schools walked carrying placards and posters on peace and nuclear disarmament.

At a function organised by the Indian Federation of United Nations Associations, Minister of State for Communications Ram Niwas Mirdha said that only a very strong public opinion could influence the advocates of nuclear weapons. He appealed to all peace lovers to campaign against nuclear weapons.

The Committee for a Sane Nuclear Policy organised a panel discussion on Nuclear Prolifera-

tion and Arms Race at which Congress MP G G Swell said the world had two options on nuclear arms race. One is the Soviet proposal to de-escalate nuclear weapons by 35 per cent and to limit all nuclear testing to laboratories within the next 35 years. The other option, he said, was the US proposal to destroy the present nuclear stockpiles by 50 per cent and not deploy SDI weapons for another seven years.

Non-nuclear weapon nations could provide the cutting edge to the sword of moral offensiveness, said Mr Swell.

**Pak envoy's denial:** In his address, Pakistan's Ambassador to India Dr Humayun Khan said like India, Pakistan was committed to using nuclear energy only for peaceful purposes. He said Pakistan was not planning to go for nuclear weapons, also because it would have to pay a high price for doing so and would get little security in return.

Retired Justice V R Krishna Iyer said it should not be assumed that nuclear power was the only energy option available in the future but it should be only used as a last resort.

The Indo-Soviet Cultural Society also held a public meeting to observe Hiroshima Day and to support Indian and Soviet peace initiatives.

At a Hiroshima Day meeting organised by the Delhi State Committee of the Centre of Indian Trade Unions, solidarity was expressed with the struggle of the people of South Africa and Nicaragua.

INDIA

# MADRAS ATOMIC POWER STATION UNIT SYNCHRONIZED

New Delhi PATRIOT in English 4 Aug 86 p 5

[Text]

Madras, Aug 3 (UNI)—The 235 mw second unit of the Madras Atomic Power Station (MAPS) at Kalpakkam, near here, was synchronised with the grid at 1000 hrs this morning, MAPS Director K S N Murthy told UNI here on trunk telephone.

The unit, which was taken off the grid on Wednesday last after the detection of malfunctioning of an electronically controlled valve, was now producing 110 mw, Mr Murthy said.

The power production would be raised to the rated capacity in phases, he added.

The unit was to have been recommissioned 38 hours after it was taken off the grid but some minor problems had delayed it.

Mr Murthy said start-up operations had begun on the 235 mw first unit, which was expected to be synchronised with the grid "very soon".

Meanwhile, the report of yesterday's leak of helium from the second unit of the MAPS has created a scare among official circles and in Delhi.

Although the gas is neither radioactive nor toxic, MAPS authorities today received anxious calls from senior Central Government officials, the Pollution Control Board of the Tamilnadu Government, the Chengalpattu district revenue official and police officials, asking how the leak might affect public health.

MAPS officials told UNI that helium was a gas widely used in industries and many leaks in industrial undertakings had gone unnoticed.

The leak was plugged yesterday evening and the plant resumed power production this morning, the officials said.

/13104  
C90: 3150/0152

INDIA

# SUPREME COURT ISSUES WARNINGS ON NUCLEAR RADIATION

Madras THE HINDU in English 1 Aug 86 p 6

[Text]

The Supreme Court has issued notices to the Union of India, Jawaharlal Nehru University (JNU) School of Life Sciences and Shri Ram Institute for Industrial Research (SIRI) here following a writ petition seeking the Court's direction for ensuring the safety of a large number of people from nuclear radiation allegedly emitted by gamma chamber of the School of Life Sciences and the SIRI centre located in Delhi University.

The Bench consisting of the Chief Justice, Mr. P. N. Bhagwati and Mr. Justice V. Khairi directed that the notice, on this public interest litigation petition from Mr. M. C. Mehta, Chairman, Environment Protection Cell, be returned by August 18.

The petition said that a large number of people residing in the vicinity of these institutions had become "victims of radiation" and were suffering from various diseases. It prayed the Court to direct the managements of these institutions to shift the units to places far removed from human habitation and suspend till then further work in these institutes.

The Court was also requested to restrain the School of Life Sciences from setting up the proposed nuclear science centre within the JNU campus and to locate it in a far-away safe place.

The petition also prayed the Court to direct the respondents "to make public various reports and readings taken on the levels of radiation in the JNU School of Life Sciences and SIRI". It submitted that the nuclear radiation facility acquired by SIRI had "become a matter of serious concern to Delhi University students, teachers and people living around it", as evidenced by the reports published in certain leading newspapers published from the capital.

As the representations made by the Vice-Chancellor of Delhi University, some professors, students and others seeking the shifting of the SIRI to a remote place, evoked no response from the authorities who "are careless and indifferent to public welfare", the petitioner moved the Supreme Court, according to the writ petition.

INDIA

SWEDISH GOVERNMENT APPROVES SALE OF ASEA HOT ISOTOPE PRESS

Stockholm SVENSKA DAGBLADET in Swedish 8 Aug 86 p 29

[Article": Asea Can Export Nuclear Technology"]

[Text] On Thursday the government gave Asea Metallurgy AB permission to export a hot isotope press to India. The technology can be used in producing nuclear weapons. This occurred even though India has not signed the non-proliferation agreement on nuclear technology and nuclear weapons and even though Swedish nuclear technology normally cannot be exported to countries that have not signed the agreement.

Scandiflash AB, on the other hand, was denied permission to export X-ray flash units precisely to India. The government justified this decision by saying that India had not signed the nonproliferation agreement.

"Signing the nonproliferation agreement is a minimum requirement when we examine the export of nuclear technology and decide whether or not to grant our permission for exports," section chief Gudrun Schollin-Ericson said.

9336

CSO: 5100/2566



INDIA

BRIEFS

**BOMBAY ANTINUCLEAR DEMONSTRATION**—Over 300 people led by college students held a solemn demonstration at Hutatma Chowk, (Flora Foundation) this morning to commemorate the 41st anniversary of the atomic destruction of Hiroshima and pledged to strengthen the peace movement to "free mankind from the nuclear threat hanging over the world." Huge banners proclaiming "no more Hiroshimas" and "ban all nuclear weapons" formed the backdrop to the specially erected stage. Hundreds of white balloons—symbols of peace—were released in the sky as anti-war slogans rent the air. Slogans raised were "down with Reagans Star Wars" "Down with scrapping of Salt agreement by American imperialism" by the demonstrators who held aloft a big poster caricaturing Reagan as a personification of nuclear evil. Lalit Chari, convenor of the ad-hoc committee for the commemoration of Hiroshima-Nagasaki, read out a pledge which in parts said "on this day during the UN international year of peace, we pledge ourselves to action, seeking to prevent any use of nuclear weapons anywhere by any state against another". The speakers included, Justice P B Sawant, A K Hangal and Dr Vivek Monteiro. [Text] [New Delhi PATRIOT in English 7 Aug 86 p 6] /13104

CSO: 5150/0155

PAKISTAN

BRIEFS

ISRAEL'S ALLEGED INTENTIONS REPORTED--According to a news item published in daily AL-ITTEHAD of UAE, Israel intends to destroy Pakistan nuclear installations. The paper quoted an Israeli newspaper as having said that to achieve this end, Israeli government has asked the Indian government secretly to sign an agreement for providing necessary services, including fuel to Israeli aircraft within Indian territory for the said purpose. The reaction of Indian government regarding Israeli request has not been known. [Text] [Karachi THE MUSLIM WORLD in English 16 Aug 86 p 1] /9274

CSO: 5100/4755

SOUTH AFRICA

ACCIDENT AT PELINDABA NUCLEAR PLANT REPORTED

HR081904 Moscow In Zulu to Southern Africa 1830 GMT 7 Aug 86

[Eugene Stebanov commentary]

[Text] Reports from South Africa say an awesome accident occurred at the Pelindaba nuclear plant. Two persons died and two others were seriously injured as a result of the inferno that broke out inside the plant's premises. Please listen to Eugene Stebanov's comment on this matter:

The accident at Pelindaba clearly demonstrated the need to apply stringent measures whenever nuclear research is conducted. This incident should remind us that the South African government is using all possible means to achieve independent nuclear capability and also that South Africa intends to make use of nuclear power to manufacture weapons of war.

On 22 September 1979 the U.S. satellite (?Beria) showed that atomic weapons had been tested in the south Atlantic Ocean. Since that time, the international community of nations, including African nations, have been watching Pretoria's nuclear development program with disapproval. The countries that have helped Pretoria with expertise to achieve nuclear capability are the United States, France, West Germany, and Israel. These countries are accomplices to the crime of the presence of nuclear weapons in Africa. African countries have protested vehemently at this development.

The Boers' access to atomic weapons poses a great danger to the world, especially to countries in the southern African subcontinent. There is a great danger that the South African apartheid regime will soon use these weapons against Southern African states. WEST AFRICA, a pamphlet published in London, says: The ongoing struggle for liberation in Southern Africa might spark an atomic attack on a neighboring country by South Africa. This would be in keeping with the often repeated South African military forays into these countries. The accident at Pelindaba killed two persons, but the accident that will result from South Africa using nuclear weapons against some country in the region will kill hundreds of thousands of people. Therefore, it is imperative that all those countries that strive for international peace join forces to eradicate nuclear weapons worldwide, including in South Africa.

/12913

CSO: 1812/159

FINLAND

LARGE-SCALE NUCLEAR SAFETY STUDY FOLLOWING CHERNOBYL ACCIDENT

Overpressure Preventers Demanded

Helsinki UUSI SUOMI in Finnish 30 Jul 86 pp 1, 20

[Text] The safety of Finland's nuclear power plants from serious accidents is being increased. The Radiation Safety Center has prevailed upon the power companies to design shields against excess pressure for their plants which would serve as a last resort in the event the reactor's protective housing should not withstand the pressure.

The Radiation Safety Center began to devote attention to preparedness for serious accidents even before the Chernobyl accident.

The Chernobyl incident will apparently result in more additional measures in Finland too. New safety recommendations will be decided on at the International Atomic Energy Agency (IAEA) conference to be held in Vienna at the end of next month.

"Reports on excess pressure shields and the filter systems that accompany them are still incomplete," plant manager Jussi Helake of IVO's [Inatra Power Company] Loviisa power plant said. It will be possible to build the devices in connection with the 1988 annual maintenance operation. Helake estimated that the cost of the project would be about 5 million markkas per power plant.

The system-like equipment that is to be installed in Finland's plants is in use at the Barseback power plant in Sweden.

Safety devices are being designed for nuclear power plants in operation in Finland to protect them against serious power plant accidents. The Radiation Safety Center has asked the power companies for plans for the construction of excess pressure shields for their plants.

"We began to devote attention to protection against serious accidents early this year, or before the power plant accident in Chernobyl," department head Jukka Laaksonen of the Radiation Safety Center said.

According to Laaksonen, the experiences they had in Chernobyl will also lead to new international safety recommendations that will be implemented in Finland as well.

The excess pressure shields now being designed for the plants in operation will mean devices that release any excess pressure that may be generated in the reactor dome, but nevertheless recover radioactive materials.

Excess pressure which the reactor's protective housing does not withstand may be produced, for example, during a reactor core meltdown in connection with serious accidents. The price of the excess pressure safety device is in the neighborhood of 5 million markkas per plant.

This sort of filter housing was built into the Barseback nuclear power plant operating in Sweden to reassure residents of Copenhagen 30 km from there and to ensure the granting of a license to operate. This equipment has at least not yet been required in other Swedish nuclear power plants.

The new international recommendations will be decided on at the end of next month. At that time IAEA experts will meet in Vienna to hear the Soviet report on the Chernobyl accident. Director Antti Vuorinen and Jukka Laaksonen of the Radiation Safety Center will participate in the Conference for Finland.

#### Nuclear Safety Study Ordered

Helsinki HELSINGIN SANOMAT in Finnish 3 Aug 86 pp 21-22

[Article by Arja Nukarinen: "What All Has Chernobyl Gotten Us to Study?"; first paragraph is HELSINGIN SANOMAT introduction]

[Text] We have hurriedly begun to investigate the difficulties of a nuclear power plant disaster. There is enough to keep us busy for the next year and millions of markkas will be sunk into research.

The Chernobyl power plant accident was a lotto win for science that had not been expected beforehand. After the accident, scientists realized that they were sitting between a huge testing ground and the materials. All possible benefit and information was extracted from the accident — and is still being and will continue to be extracted from it for years to come.

Up to now, they have in many cases been able to present only assumptions about radioactive radiation and radioactive materials. Now they are getting information by means of which the assumptions can be made more accurate and corrected.

We were in the same kind of situation once before, when radiation from nuclear tests conducted in the early 1960's reached Finland. At that time, however, the fallout was of a different kind and settled on the ground over a period of 4 years. This time all of the fallout reached us in May, according to what the investigators say. Scientists and other investigators had to work quickly.

At the Radiation Center they began to measure the amount of radiation a person might absorb through food, air or water and the possible dangers to health it might result in.



The Agricultural Research Center began to determine the radioactive materials that get into milk through livestock feed and how they get into food plants through the soil.

The National Health Institute started by measuring [radioactivity] in bogs and in addition began to study how long radioactive substances are retained in nature.

University researchers began to determine the effect of the fallout on timber stands, how it gets from grass into domestic animals and the effects it has on animal reproduction and the food chain in Lapland. At the universities they began to study the behavior of atmospheric particles, by means of which they determined how fallout can be used to advantage in research in scientific farming and forestry as well as in environmental studies. They studied [the effect of] radiation on butterflies and began a study of radioactivity in birds.

At the State Technical Research Institute and the Customs Laboratory they began to check on radiation in export and import products.

Companies commissioned market and public opinion surveys by means of which they, among other things, measured Finns' attitudes toward nuclear power, officials in positions of trust's ability to deal with nuclear power plant accidents and their satisfaction with radiation reporting.

The Energy Policy Association, EVY [not further identified], hastened to do a quick study. According to it, Finland's nuclear power plants can be closed down without our having to immediately start rationing electricity. The outcome of the study was based on the assumption that Finns are now ready to voluntarily conserve electricity so that we can get rid of nuclear power. Studies are cutting across new studies helter skelter and they have not yet even begun to do anything. The work will go on for years and cost millions. Research institutes in the different sectors are participating in an enormous followup study on Chernobyl funded by the government. Most of the studies touch on the accident's effects on the environment, but underlying the work is an investigation of, for example, the reporting itself of nuclear power plant accidents.

In June the government appropriated a half a million markkas in emergency funds for research, which was provided for use by the Finnish Academy. More money is promised in next fall's supplementary budget and in the budgets of subsequent years. The institutes' funding prospects have risen to tens of millions of markkas. Education Ministry bureau chief Matti Lahdeoja estimated that they will probably get about 5 million markkas into the supplementary budget. He heads the committee that serves as an organ to maintain communications between the different ministries and the research institutes under their jurisdiction and makes funding proposals for Chernobyl studies.

No one is capable of estimating the number of research projects prompted by Chernobyl, nor can they be brought together in one spot. The Radiation Center bears the chief responsibility for the studies. Olli Paakkola, the head of

the center's Monitoring Department laughed at the fact that there is not a library in all of Finland big enough to hold the results of all of the studies following the accident.

Since the end of April, they have had 16-to-18-hour workdays at the Radiation Safety Center Monitoring Department. The other important research institutes too, like the Meteorological Institute, the Agricultural Research Center, the Interior Ministry Rescue Department and the General Staff Safety Bureau, started working overtime soon after the day of the accident, 26 April.

#### Academy Operates at Record Speed

As early as May and June, the Finnish Academy decided to fund 10 scientific studies with a total of 687,300 markkas. The funds were used to take samples and for research assistants' salaries.

The Academy's Environmental Science Committee granted emergency funding for seven studies and the Agriculture and Forestry Committee for three. Prof Jouko Tuomisto, a member of the Environmental Science Committee, told us that the funds were granted at record speed. Applying for funds may take as long as 6 months, but this time it took only weeks.

Despite the Academy's promptness, many researchers had to start their work before the funding was decided on. They had to be able to take samples and study them with only a few days advance notice since radioactive iodine 131, for example, has a half-life of 8 days. The fact that few research institutes had the costly research equipment needed for the job also hampered the analysis of iodine.

The projects funded by the Academy are preliminary studies, the funding of which will expire at the end of the year. Further funding will be decided on after the end of the year when the researchers have presented the Academy with their interim report and continuation plan.

The Academy has granted funding to, among others, a joint committee for a study of the effects of the nuclear power plant accident which will try to tie together the Chernobyl studies. The committee's tasks and composition will not be decided on definitively until the fall, but Prof Pentti Kauranen of the University of Kuopio has already been invited to serve as chairman.

With the support of the Academy, they have begun three studies at the University of Helsinki and two in collaboration with the University of Kuopio. One study has been launched at Abo Academy.

The Academy has furthermore granted funds for a preliminary study to the Meteorological Institute, which is arranging for the handling of the materials produced by the Chernobyl incident and the samples as well as for followup observation.

With a grant provided by the Academy, university lecturer Antti Haapanen of the Environment Ministry is studying the biological effects of the nuclear power

plant catastrophe on Finnish frogs. In May the Agricultural Research Center and the Radiation Safety Center observed the passage of radioactive substances from livestock feed to milk. Four cows were allowed to graze and the iodine, cesium and strontium contents of the milk they produced were calculated from day to day. Recommendations were made on the basis of the results because it was safe to let the cows out.

The radiation team formed at the Agricultural Research Center is preparing guidelines for agriculture in the event that what occurred in April should repeat itself. These guidelines are expected to be ready by the end of the year. With Academy funding, at the Research Center they are studying the passage of radioactive substances from the soil into food plants over a period of about 3 years.

In Kuopio university lecturer Matti Jantunen of the National Health Institute is directing a study of the half-lives of radioactive substances in a city environment. The initial results will be published at the end of the year, but the researchers have already noted to their surprise that the radionuclide, cesium 137, for example, does not appear to have passed on into anything after falling to earth.

The many bog studies have kept the National Health Institute and its partner in collaboration, the Radiation Safety Center, busy. Radioactive materials that fell on bogs, including peat bogs, were measured and, on the basis of measurements, the surface peat was skimmed off the tops of five bogs that produce peat for fuel. The results of the peat bog measurements and the fallout chart will be published after the summer vacation.

These studies will be continued next winter when the passage of radioactive fallout materials from burning peat into the air will be observed. We will obtain the results on the amounts of radionuclides, their behavior during burning and the amount released into the air in about a year. The same sort of study was made in the 1960's on pollutants produced in the testing of nuclear weapons. The study will also be extended to skimmed bogs, at which point we will see how much skimming has reduced the release of these materials into the air.

The National Health Institute is also studying the people who work on peat bogs, who have gotten to the point of worrying about their possible exposure to radiation. While consideration of the results is incomplete, they have noted that there are no very big problems.

#### Reporting Is Still a Problem

The Radiation Safety Center operates a little in every area — it performs tasks where and when they are necessary — but it mainly continues to struggle with millisieverts and becquerels. It is trying to find out how many millisieverts of radiation a person normally receives and how much he is now exposed to. It is reporting on becquerel levels in foodstuffs. On the basis of the results of the study, they urge people, for example, to continue to avoid eating fish caught in small lakes as a staple food more often than several times a week.

At the Radiation Safety Center they are studying rain, river, lake, sea and drinking water and observing [the effects of] direct radiation from the air and dust in the air. Dairy products, meat and grains are the most important foods from the standpoint of the measurements.

They are now also examining berries and mushrooms and some time from now fall grains. Before the hunting season, they will hold a test hunt at which time they will determine radiation levels in game. They have been observing radiation levels in deer killed in collisions throughout the entire summer. They have been continually taking measurements of fish, algae, vegetables, fruit, roots and grass.

The results are being compared with the data obtained from studies made in the 1960's and readings to be obtained on subsequent crops.

The job has been a huge one, since every study sample is thoroughly analyzed. For example, a complete radiation study on milk takes a full month, although data that provide indications are obtained as soon as in a few days time.

Department head Olli Paakkola said that the time for real decisions by leading scientists will not be until sometime in the future. The most important thing now is to determine how safe it is to eat our food.

"Through some of the studies we will determine what has to be done with contaminated food or land. If at some time there is a fallout 10 or 100 times greater than the one produced by Chernobyl, we must know how to act so that people will not unnecessarily be exposed to radiation. All of this kind of research results in knowledge pertaining exclusively to health," Olli Paakkola said.

In addition to these studies, the Radiation Safety Center has had to constantly disseminate information. Center employees have been answering people's uncertain questions since the end of April. They are constantly asking for exact radiation readings for specific areas. "It seems as if everyone expects that just his berry-picking preserve or fishing ground will be measured, and that's impossible."

During the first few weeks, reporting on Chernobyl was chaotic and reporting is still being investigated in collaboration with the Universities of Helsinki and Tampere.

In Tampere they are now reviewing newspaper reporting following the accident and its development. Later on, they will interview people so that they may determine how citizens' opinions have changed since the accident. A report on Finland's image in the world may be added as a third part of the study.

It is the University of Helsinki's job to determine how news about the accident circulated in the national government. They will try to make the initial results of the study public by the end of the year.



As for the Finnish Broadcasting Corporation, it is investigating its own reporting of the Chernobyl accident.

The investigators too are wondering how one should go about reporting [such] news. They feel that they are caught between two fires: Should all the news be reported immediately and, if it should, how should it be reported? There should be no errors, but measuring instruments too sometimes provide false readings.

The rise in radiation levels due to the Chernobyl accident was first observed in Finland at the Kajaani metering station. University lecturer Matti Jantunen said that they had at first suspected that the reason for the increased radiation levels was a local rise in radon levels. This is often the case in spring. They wanted to verify the fact before publicly releasing the information. Later on, officials were showered with invective for having kept the information secret.

When the stir over Chernobyl had already died down, word of high radiation readings in Kotka spread quickly throughout the world. The so-called Kotka barb proved to be a meter error. But officials had immediately released the report for publication and it created a stir in, for example, the United States. Department head Paakkola said that he had received phone calls from five U.S. television stations on that same day.

After the Kotka incident, there were at least two errors of the same sort in Finland, on which silence was maintained.

The effect on the United States was also visible in the market surveys that were conducted after the accident. Valio conducted its own survey on dairy product sales in the United States since the company's dairy product sales had plummeted in its biggest export country. According to the survey, over half of those who normally eat Finnish cheeses had decided to change brands or were hesitant about buying. The Kotka barb pricked a new hole in sales shortly after buyers on the other side of the Atlantic had been gotten to believe that Finnish cheeses could be eaten without fear. So far, Valio is not planning a new survey.

Among others, Finnair and the Tourism Promotion Center, which will have completed a precise report in the fall on tourism this summer, are conducting their own market surveys.

The Economic Survey Center for Agriculture follows the progress of dairy product sales and particularly buying patterns in the United States.

The accident has given rise to a large number of joint international studies. In the Nordic countries the NKA (Nordic Contact Agency for Atomic Energy Issues) is conducting studies. Chernobyl has already been discussed at several international congresses and new ones will continue to be organized 5 and even 10 years from now. Among others, the IAEA and the World Health Organization (WHO), whose European office is gathering information chiefly on studies that have been conducted on the effects [of the accident] on people's health, are launching their own studies and reports.



Together with WHO, the UN committee, UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation), which is studying the effects of radioactive radiation, is publishing the most comprehensive and important written report. The report will be completed in a year's time at the earliest.

#### Forest Death Tie Asserted

Helsinki HELSINGIN SANOMAT in Finnish 3 Aug 86 p 22

[Article by Jouni Tulonen: "Is Nuclear Power Accelerating the Destruction of Forests? Prof Erkki Lahde Urges That the Condition of the Trees in the Neighborhood of Loviisa and Olkiluoto Be Studied"]

[Text] The Chernobyl catastrophe demonstrated that a serious nuclear power plant accident can occur wherever and whenever. While the nuclear power industry can no longer advertise nuclear power as an absolutely safe form of energy, this at least demonstrates more cogently than before that a normally operating nuclear power plant generates really clean electricity that is kind to the environment.

In Central Europe, however, since the 1980's there have been disputed studies according to which nuclear power, even in normal use, is one cause of the alarming destruction of forests. The West German scientist, Gunther Reichelt, was the first to notice that in the Federal Republic there were noticeably more damaged trees in the proximity of some nuclear power plants and uranium mines than in the charted area in general. According to Reichelt, there was no other industry worth noting in the areas under study that could have caused the damage.

A particularly interesting discovery was the fact that most of the damaged trees were at those points of the compass toward which the prevailing winds blew. They believed that this indicated that radioactive discharges from nuclear power plants moving with the wind might actually accelerate the death of the forests. Later, in both Switzerland and France they conducted the same kind of studies, the results of which supported Reichelt's observations.

Reichelt's studies have been sharply criticized in the Federal Republic; among other things, his method for charting forest damage is regarded as questionable. It has also been pointed out that he was unable to sufficiently well eliminate the importance of other air pollutants and especially of pollutant fallout coming from a distance in his studies. The nuclear power industry, which has constantly stressed the fact that nuclear power is an alternative to coal-burning power plants which cause forest deaths, has naturally reacted particularly vehemently to this.

At any rate, the German studies have, among other things, caused a scholar at the University of Lund to urge that a study be made of the condition of the forests surrounding Sweden's nuclear power plants. Prof Erkki Lahde of the Forest Research Institute considers the observations made in Central Europe to be interesting enough for there to be reason to set in motion a similar study in Finland too.

"Several Central European nuclear power plants and uranium mines are located in the middle of common forest areas, which makes them very appropriate candidates for this kind of study. Both the Loviisa and Olkiluoto nuclear power plants are on the coast and it is more difficult to determine their effect on the forests. The study should be planned very carefully so that the evidence does not have the power to influence people in one direction or another."

According to Lahde, the most important thing is to find comparable areas in which all the known air pollutants are the same as in the Loviisa and Olkiluoto forest areas. By comparing the condition of the trees, it can be determined whether, specifically, nuclear power plants really constitute some sort of hazard to the forest.

"Someone ought to take the initiative with this kind of study. It would be very suited to the Feature [possible typo for ilma 'air, atmosphere, image'] Project funded by the Environment Ministry and the Agriculture and Forestry Ministry, in which they are in general studying the effect of air pollutants on Finland's forests. Obviously, it will be hard to get funding for such a sensitive research subject," Lahde said.

#### Radioactivity Does Not Have a Direct Effect

Nuclear power experts dispute the results of Reichelt and his colleagues' study because the annual radioactive discharges reported for nuclear power plants are so small in comparison with nature's own background radiation that they cannot have any effect on forests.

As for Reichelt, along with physicist Roland Kollert, he has attempted to prove that radioactive discharges strengthen the effect of, for example, sulphur and nitrogen pollutants even though they do not directly damage trees. According to them, nuclear power plants are one link in a chain that is strangling the forests of Central Europe.

In a recent book, Reichelt and Kollert maintain that occasionally — for example, in connection with the switching on and off of plants — radiation levels clearly rise for short periods of time, although annual radiation levels are indeed low.

These "radiation peaks" and natural radiation may together over a long period of time serve as a threshold factor that triggers illness in trees taxed by other pollutants.

In laboratory experiments it has been noted that radioactive radiation ionizes the air and changes the composition and electrical charge of chemical compounds, air pollutants, for example. Pollutants then more easily than before affect the trees' needles and stop their chlorophyll production.

The elements also react sensitively to one another, thereby giving rise to new compounds that are more damaging than before. These are, for example, the so-called free radicals which have been proven to be more destructive than, for example, sulphur dioxide.

The big power transmission lines also ionize the air, which probably plays a role in the damages that have been observed in forests in proximity to nuclear power plants. Also, ozone is generated around power lines, the increase of which in the lowest layer of the atmosphere a new study views as one important cause of the destruction of forests. According to Reichelt and Kollert, what is involved is the combined effect of very many individual factors.

In Finland both the representatives of the nuclear power industry and radiation safety officials regard "peak theories" as being unfounded. According to them, discharges do not even for short periods of time increase to such a level that they might damage forests in one way or another.

Chief inspector Raimo Hentela of the Radiation Safety Center matter-of-factly asserted that there is no need in Finland for studies of forests in the proximity of nuclear power plants.

#### We Don't Know Everything There Is to Know About Nuclear Power

Prof Arkki Lahde does not believe that the "absolutely certain scientific knowledge" palmed off on us by the nuclear power experts is necessarily the final word on nuclear power.

"Nuclear power plant accidents and problems with the storage of waste materials demonstrate that the process is not entirely under control. I also think that it is quite possible that a nuclear power plant may release so little radiation that we are incapable of even measuring it with current methods, but which may have an effect on the natural environment. It is naive of us to believe that science is all-powerful and all-knowing in this area either."

Helsinki University professor of environmental protection Pekka Nuorteva thinks that the observations in connection with nuclear power and forest deaths are interesting. According to him, the importance of the observations is, nevertheless, more theoretical than practical. Investigators are now concentrating on determining how radiation in general — and in particular sunlight — changes the usual air pollutants.

"The use of fossil fuels is still the most important single cause of the destruction of forests and nuclear power will certainly be publicized as the savior of Europe's forests in future as well.

"For conservationists the choice between nuclear power and, for example, coal is the same as the choice between the plague and cholera. While sulphur discharges destroy forests directly, radioactive discharges affect genes, which preserve the whole natural economy," Nuorteva said.

Since radioactive discharges affect hereditary factors slowly and over a broad spectrum, the effects on statistics are easily lost. This does not, however, mean that there are none. The knowledge gained from the study of the long-term effects of radioactive radiation per se is relatively scanty so far.

Attention has been devoted to, among other things, how certain radioactive elements behave in the human body. For example, it has been noted that tritium in the organs of the body is transformed into helium, which breaks up the DNA chains of the genes. There is noticeably more tritium in nuclear power plant discharges than in natural radiation.

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CSO: 5100/2563

SPAIN

BRIEFS

NUCLEAR WEAPON PRODUCTION REPORTED--Air Force Brigadier General Jose Maria Salas Larrazabal affirmed yesterday at the La Granda summer courses in Aviles that Spain is on the verge of producing its own atomic bombs. Salas Larrazabal said that "only the consent of the highest military authorities is needed" for Spain to begin producing this type of weapon. [Text] [Madrid DIARIO 16 in Spanish 1 Aug 86 p 8] /8309

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SWEDEN

NUCLEAR REGULATORY AGENCY: COUNTRY COULD HANDLE MELTDOWN

Stockholm DAGENS NYHETER in Swedish 11 Aug 86 p 14

[Article by Bo Emanuelsson]

[Text] Personnel at Swedish nuclear power plants have 10 hours to deal with a meltdown. This is how long the Nuclear Power Inspection Board (SKI) estimates that the containments will hold before 0.1 percent of the nuclear reactors' radioactive cesium and iodine will leak out to the environment.

This was stated by Lars Hogberg, acting director general of SKI, in an interview with TT (TIDNINGARNAS TELEGRAMBYRA).

"The fear of a major nuclear accident is justified, but we should not conclude from this that every little leak and every crack will automatically lead to a serious accident. There is a tendency to overdramatize the situation," Lars Hogberg said.

During the 10 hours, the radioactive core must be cooled by the existing water system, which will be improved, at Swedish nuclear power plants.

SKI does not believe, however, that any improvements are needed at Barseback 1 and 2, but that the filter that is installed there will deal with the radioactive substances during the critical 10-hour period.

"But if emissions exceed 0.1 percent, then the situation will be much worse," Lars Hogberg said.

More Cancer Cases

Even if no one dies from acute radiation sickness when emissions reach 0.1 percent, the number of cancer cases would increase. In addition, even a 0.1-percent emission would mean that small amounts of land would be unusable.

"We must be prepared to accept minor emissions in order to save the reactor containment. It would be much worse if the containment were to burst," Lars Hogberg said.

He added:

"The minor faults that occur constantly do not result in safety problems, but primarily in operational problems and radiation exposure for people who repair leaks and cracks."

"Before there is major damage to a pipe, there is a small leak that we can detect and repair."

### 23 Shutdowns

According to the quarterly report from SKI, during the first quarter of this year reactors were shut down as a result of major or minor problems a total of 23 times at the 11 Swedish nuclear reactors. The greatest number occurred at Barseback 1 and 2, with four and three shutdowns, respectively. There were four shutdowns at Forsmark 3 and three at Oskarshamn 1.

In addition, operation was disrupted, without shutdown, on 15 occasions and, finally, reactor power was reduced 16 times as a result of monitoring at various facilities.

"The most important aspects of this work are constant supervision, monitoring, and prevention. Most problems can be detected at an early stage with the existing safety system. The 'only' problem is to make sure that this work never becomes routine," Lars Hogberg said.

He admits, however, that even leaks and cracks that are plugged and repaired can become a safety hazard. This could occur if there are so many repairs that faults develop in the material or that the reactor becomes almost unusable. This was the reasoning behind the decision to replace the steam generator at Ringhals 2, at a cost of 1.2 billion kronor.

"It is best for the reactor to be as safe as possible during the remainder of its lifetime, whether that will be 4 years or 24 years. Safety cannot be measured in terms of money. This is the philosophy behind the Swedish nuclear power program," Lars Hogberg said.

### No Predictions

Since nuclear power was introduced in Sweden in earnest during the early 1970's, with the opening of Oskarshamn 1 in 1972, the experts have changed their opinion several times and have detected problems they never believed could occur. As a result, SKI makes no predictions concerning reactor safety for periods longer than 3 to 5 years. No too long ago, it was claimed that the reactors had a lifetime of 40 years.

The problems that have occurred that had to be repaired include stress corrosion at Ringhals 1. As a result, 260 meters of pipe had to be replaced. Another problem has been and continues to be leakage in pipes at Ringhals 2. As a result, so many pipes have been repaired that the reactor must operate at reduced power until the steam generator is replaced.

## Brittle Vessel

The greatest problem at Oskarshamn 1 has been embrittlement of the reactor vessel. In addition, the containments at all reactors except Barseback 1 and 2 must be provided with better protection against meltdown. The problems are greatest at the newer boiling-water reactors at Forsmark 1-3 and Oskarshamn 3.

"Before the meltdown at Three Mile Island near Harrisburg, no one believed there could be a meltdown. All the safety work was directed toward preventing a meltdown and repairing major damage to pipes," Lars Hogberg said.

Safety work was guided by the so-called Rasmussen Study of 1975, according to which a meltdown was so extremely improbable as to be negligible. Forsmark 1 and 3 and Oskarshamn 3 were built with this principle in mind. After Harrisburg, nuclear power experts had to change their way of thinking and after the accident at Chernobyl, the effort to protect the containments has been accelerated, so that it will be complete in 1988 instead of 1989.

"We have been unable to make any safety calculations," Lars Hogberg said. Nevertheless, such calculations may be found in the SKI publication Svara Karnkraftsolyckor (Major Nuclear Accidents), which presents guidelines for reinforcing the containments. This publication states:

"The requirements do not apply to events of extremely low probability. This means major ruptures in the reactor vessel."

"We are not making calculations with figures, but we can simply state that the containments cannot withstand a major rupture in the vessel. Consequently, all work must be directed toward monitoring the reactor vessel so that weak parts may be detected and replaced," Lars Hogberg said. The radiation in the vessel alters the vessel material.

"There are no indications, however, that this represents any major problem at Swedish nuclear power plants where we have both good original material and a good monitoring program. But we are keeping a close eye on the oldest reactor, Oskarshamn 1," Lars Hogberg said.

But the SKI quarterly report mentions an accident that "normally should not occur."

In February there was an "explosive ignition at the Studsvik incinerator," where uranium-containing residual products are burned. The report indicates that SKI feared there had been personal injury and radioactive emissions. The explosion itself was called a "breakdown with consequences for safety." No one was injured, however, and according to the report the emissions were "insignificant." Operations at the incinerator facility started up again 11 days after the accident.

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SWEDEN

# SAFETY WORK ON REACTORS SPEEDED UP FOLLOWING CHERNOBYL

Helsinki HELSINGIN SANOMAT in Finnish 3 Aug 86 p 18

[Text] Stockholm (TT)—Improvements on the protective structures of Sweden's nuclear power plants are taking place faster than planned. The goal is to be able to keep radioactive material inside the protective housing in the event of the worst possible nuclear power plant accident imaginable — a reactor core meltdown.

Before the accident that occurred at the Soviet nuclear power plant in Chernobyl, the goal was to have the improvements completed by the end of 1989. After the Chernobyl accident, however, the government demanded of the nuclear power plants that they get the repairs on the protective structures done by the end of 1988.

Acting general manager of the Swedish Nuclear Power Inspection Office (SKI) Lars Hogberg told the TT [Tidningarnas Telegrambyra] news agency this weekend that they will have filled the protective housings with water at the two Swedish nuclear power plants which require the most improvement, Oskarshamn 3 and Forsmark 3, as early as this summer.

The Forsmark 1 and 2 protective housings can be temporarily filled with water. Hogberg added that the work to improve the Oskarshamn 3 and Forsmark 3 protective housings is not finished, but that the most important improvements will be done this summer.

In the report, "Difficult Nuclear Power Plant Accidents," dated in February, the SKI points out that a great deal has indeed been done to improve the safety of Swedish nuclear power plants, but that the possibility of a core meltdown cannot be excluded.

Hogberg said that they did not take a reactor core meltdown into consideration until after the accident that occurred at the U.S. Three Mile Island power plant. He added that after the Chernobyl accident it became more and more timely to be concerned over whether the protective housings would withstand the strain in the event of a major accident.

The possibility of a reactor core meltdown cannot be eliminated despite all the safety measures.

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